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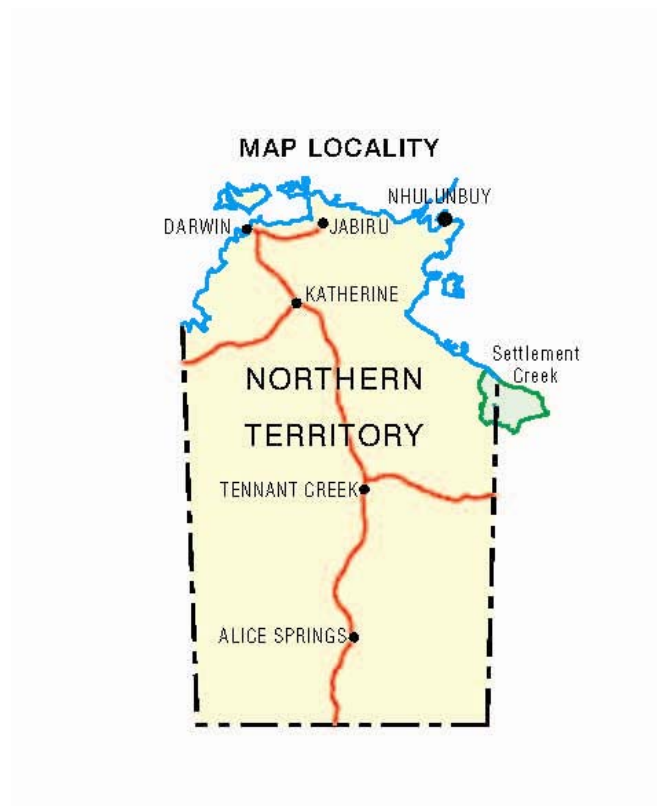
Water Management Plan



Redbank Mine

Water Management Plan

(WMP)



Prepared for: Redbank Mines Limited

Prepared by: EcOz Environmental Services

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1 INTRODUCTION

Redbank Mine ceased small scale processing of remnant ore stockpiles in late 2008. The site is now under care and maintenance (C & M). A change in management coincided with the injection of funds from a new shareholder and the company is now planning an exploration and drilling program for 2009 to further understand and quantify the ore reserves within the existing tenements. An EIS for the planned expansion will also be prepared during 2009.

A permanent presence of onsite caretakers will remain throughout this period. Two C&M staff will also remain to manage, monitor and assist in the remediation of the site and its environmental legacy issues.

1.1 Purpose of the Water Management Plan

This Water Management Plan (WMP) is designed to outline any potential water issues generated by mining operations. This incorporates both surface and groundwater and involves an assessment of aspects involved in the development and operations of mine life.

Environmental conditions, i.e. surface water and ground water will be monitored by a series of methods, Surface and Groundwater monitoring and Biological monitoring. This allows for the early detection of contaminants entering the natural system resulting in a rapid response to stop or minimise any ill effects that these may have.

This WMP also promotes the development of strategic plans designed to prevent the occurrence of water contamination in natural systems.

Our objective is to demonstrate achievable, realistic and practical continuous improvement with measurable timeframes.

1.2 Water Management Plan Objectives and Targets

RBM Operations is focused on reducing the impact that past mining operations are having on the surrounding environment, in particular the water ways. As a result, the focus over the period of this WMP will be on improving the existing legacy issues present on site. With this in mind, the following targets have been set (**Table 1**).

Table 1: Targets and Time Frames Set by RBM Operations Pty Ltd for Water Contamination Levels

Target	Time frame
Reducing off site water contamination to 50% of current levels	End of 2009/10 wet season
Reach water quality levels of ANZECC guidelines 80% protection level between Hanrahan's Creek and the 12 Mile Creek/Settlement Creek Junction	End of 2011/12 wet season
Reach water quality levels of ANZECC guidelines 95% protection level downstream of the 12 Mile Creek/Settlement Creek Junction	End of 2013/14 wet season

This will initially be achieved by reducing the amount of contaminated water present in the Sandy Flat Pit, thus preventing any surface water breaches from this facility as well as stopping contaminated water from expressing into the palaeochannel. A strategic plan regarding site storm water and groundwater understanding and management will be developed by the end of July 2009 in order to achieve these goals and targets.

1.3 Commitments made under this Water Management Plan

The WMP is valid for 12 Months and requires submitting three months prior to the Mining Management Plan (MMP) which is due annually on the 6th of May. **Table 2** outlines the commitment made for the duration of this WMP and the expected timeline for their completion.

Table 2: Commitments made for the term of this WMP and their expected completion dates

Operation/Commitment	Expected Completion Date
Digital Terrain Modeling (DTM)	Completed
A final Plan for Dewatering the Sandy Flat Pit <i>Plan well developed but not at reporting stage yet</i>	August 1, 2009
An understanding of required Pit Levels <i>Confirmation of initial figures are underway utilizing new DTM data.</i>	August 1, 2009
Environmental Monitoring Bore Locations and drilling Plan <i>Bore locations identified – report being prepared</i>	August 1, 2009
Sandy Flat Pit Water Management Strategy	August 1, 2009
New Water testing Equipment Sourced <i>Ordered and in transit</i>	August 1, 2009
Installation of Monitoring Bores <i>Drill rigs in site and prepared to install EMB's once exploration drilling is complete.</i>	August 2009
Commence Water treatment <i>Dependant on WDL being issued</i>	August 2009
Strategic Plan for Ground water and Storm Water Management	September 30, 2009
Water Balance	September 30, 2009
Chemistry of Seepage Trench Analysis	September 30, 2009
Collation and analysis of historic data	October 31, 2009
Reduction of Off Site water Contamination by 50%	End of 2009/2010 Wet Season

2 CURRENT PROJECT SITE CONDITIONS

2.1 Climate

According to the Koeppen Classification System (**Figure 1**) Redbank Mine lays within the tropical environment in the gulf region of the Northern Territory. The tropical climate is characterised by two distinct seasons, the wet and the dry. The wet season (October through April) consists of increased average temperatures (**Figure 2**), the majority of annual rainfall (**Figure 3**) and increased humidity (**Figure 4**). Due to this contrast in seasons, the majority of the ~961 mm of rain received in the region fall within the months of November through March (Bureau of Meteorology).

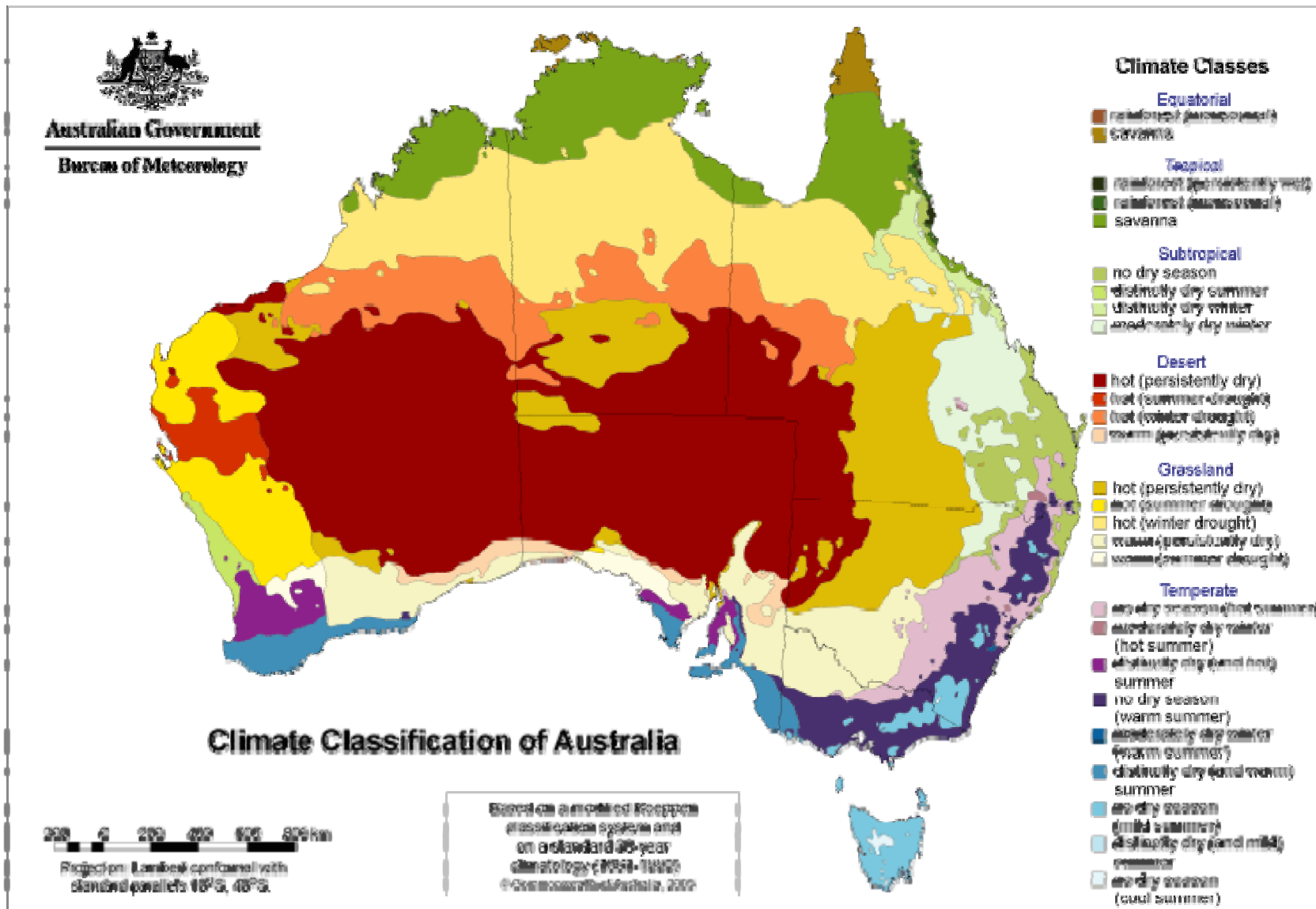


Figure 1: Climate classification using the Koeppen classification system supplied by the BOM.

Redbank Mine and the Wollogorang station region are also influenced by Monsoonal rains, cyclones and ex-cyclones that have the ability to dump large amounts of water over short periods of time. This is highlighted by the rain gauge readings taken at Redbank mine. 849.9 mm of rain fell between the months of October 2008 to end January 2009 (**Appendix A**). High wind speeds can also be experienced however mean monthly wind speeds range from 4.7 km/hr to 9.9 km/hr (BOM).

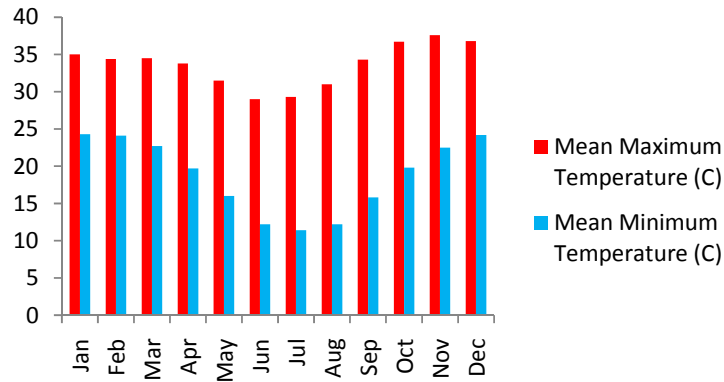


Figure 2: Maximum and Minimum Monthly Mean Temperatures (°C) at Wollogorang Station (1974-2009): ~30 km East of Redbank Mine.

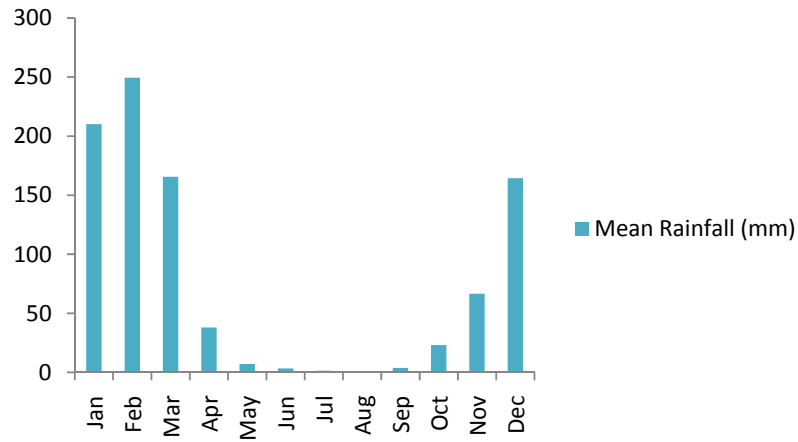


Figure 3 Mean Monthly Rainfall (mm) at Wollogorang Station (1967-2009): ~30 km East of Redbank Mine.

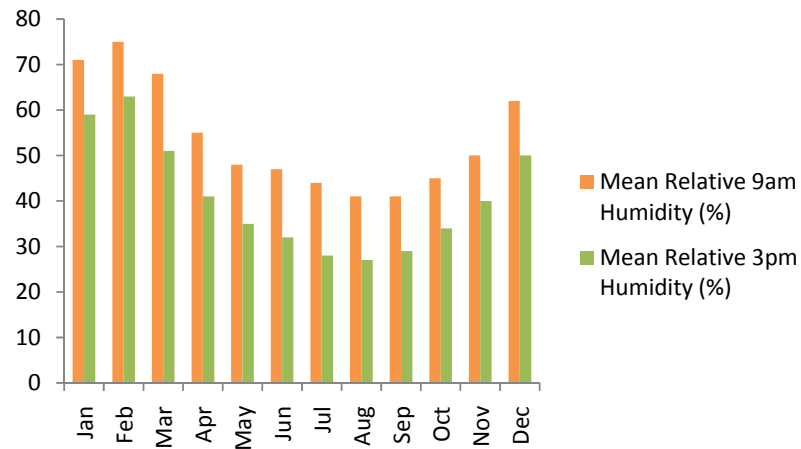


Figure 4: Mean Monthly Relative Humidity (%) at 9am and 3pm at Wollogorang Station (1974-2009): ~30 km East of Redbank Mine.

2.2 Surface Water Catchments

Redbank mine lies within the Settlement Creek catchment. This catchment spans across the Northern Territory and Queensland border (refer Title Page) and covers an area of more than 15,000 km². The majority of the catchment lies within Queensland. The NT section of Settlement Creek catchment has declared beneficial uses. The beneficial uses for this area are Environmental, Riparian and Cultural. These declared beneficial uses are designed to protect and manage the water resources within the area, and allow the local community to place specific values on the water to allow for its sustainable use.

Redbank mine lies within the western portion of this catchment on the Savannah Way, approximately 22 km east of Wollogorang homestead (**Figure 5**). As outlined in **Figure 6**, there are a number of sub catchments within the ERL of Redbank Mine. There are two main catchments directly associated with the Redbank ERL. The Sandy Flat Pit is located in the southern catchment known as Hanrahan's Creek catchment (H1 and H2), after the small creek of the same name flowing past the mine site. The Hanrahan's Creek catchment has an overall area of approximately 1340 ha, the majority of which is upstream of the Sandy Flat Pit. Approximately, 1.5 km downstream of the Sandy Flat Pit, Hanrahan's Creek joins with Echo Creek. Approximately 1970 ha of the Echo Creek Catchment is positioned upstream of this juncture (E1) and a further 715 ha of the Echo Creek catchment is downstream (E2). This system then flows into 12 mile creek and eventually into Settlement Creek which subsequently releases into the Gulf of Carpentaria.

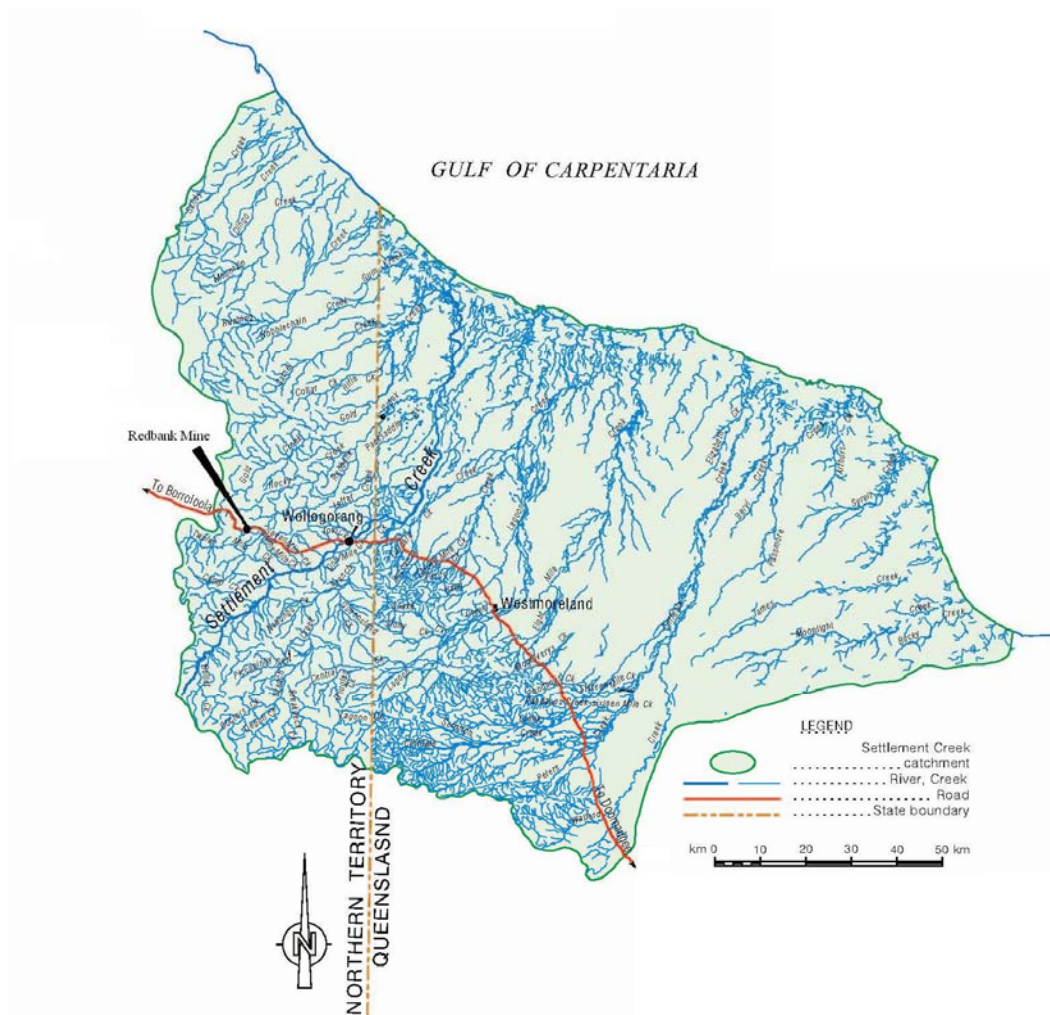


Figure 5: The Settlement Creek Catchment (NT Government Declared Beneficial Use).

The northern half of the ERL is the Redbank Creek catchment. As can be seen in **Figure 6**, for management purposes, this has been split into smaller sub-catchments as each of these may be affected in different ways by different proposed mining activities. The northern sub-catchment is positioned upstream from any current mining activity and fresh water flows will enter Redbank Creek from this area (R1). This sub-catchment has an area of approximately 965 ha. The southern three sub-catchments (R2, R3, and R4) all contain tributaries of Redbank Creek in areas where mining activities will potentially impact them. The area breakdown of these three sub-catchments can be seen in **Figure 6**. Together, the total area upstream of potentially affected areas is approximately 1800 ha. This Redbank catchment is a part of a much larger one that eventually reaches settlement creek in times of flow. There are two small sections of the ERL that are not highlighted as being a part of a catchment. These small sections, both in the south eastern corner, have a surface water flow direction away from the mine sites and as a result, shouldn't be affected by mining activities. **Figure 6** is an interpretation of the catchment systems and areas and RBM Operations is currently performing Digital Terrain Mapping that will provide detailed information that will allow accurate mapping of the catchments.

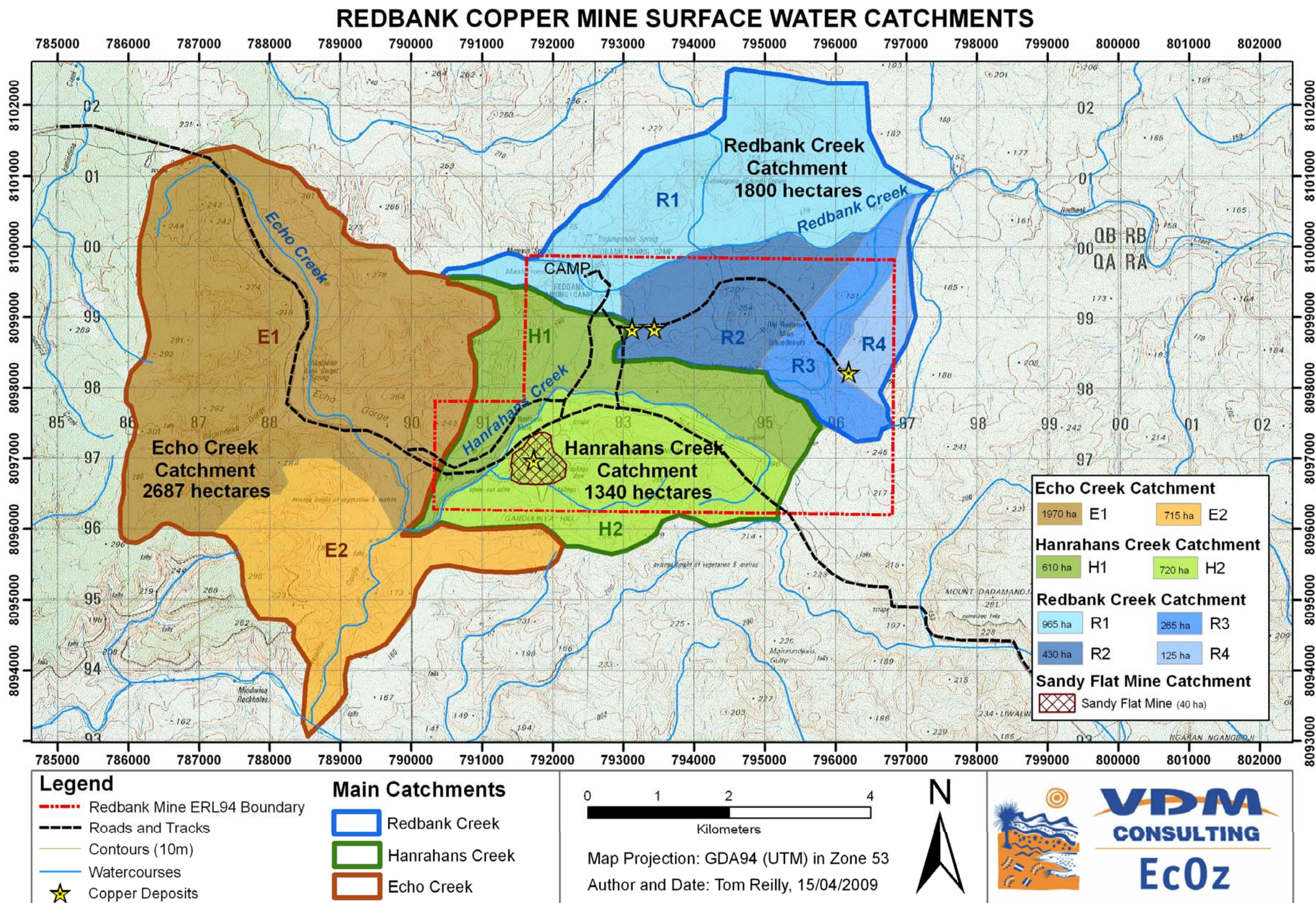


Figure 6: Catchments in and around the Redbank Mine Area

2.3 Groundwater Resources

According to NRETAS Maps, there have been a total of 15 bores drilled within the Redbank Mine lease, however three of these are now considered unavailable. The Department of Regional Development, Primary Industries, Fisheries and Resources (DRDPIFR) has also supplied the locations of a further 5 bores that have been regularly tested since 2002. As a result, 17 bores are available for sampling purposes (**Appendix B**). The majority of these bores are located around the Azurite and Redbank Pit sites however there are approximately six positioned at the Sandy Flat Pit and plant area. These have recorded high levels of Copper (Cu), Iron (Fe) and manganese (MN) as well as low pH levels and high Electrical conductivity. There is also one bore at the mining camp itself. This bore is used for potable water, cooking and camp use and the water is extracted from a depth of 24 m. It is known that the flow rate of this bore at least is dependent on the proceeding year's rain. It is believed that the ground water is approximately 15 m below the surface on average during the dry season and approximately 4 m below the surface on average in the wet (Redbank Copper, 1992). A maximum low of 16 m occurs in November, before groundwater recharge due to the wet-season. At the time of drilling, tested parameters were generally within acceptable levels, however in some instances Iron (Fe) and pH were both outside of non-health related acceptable levels (**Appendix C**). Since this time however, holes and leaks in settlement and liquor ponds have been located resulting in an unknown quantity of acids and liquor potentially entering the groundwater. As a result, more testing is required to determine the potential contamination levels in these areas. Due to the uncertainty of the existence, locality and quality of these NRETAS Maps listed bores, EcOz Environmental Services will visit the site to locate the existing bores and take samples from them to determine the current groundwater quality. EcOz will also develop an ongoing sampling and management plan. This sampling will be performed to assist with all aspects of groundwater use from mine operations and process to potable water for cooking and drinking. Further groundwater monitoring bores will be drilled this year, however the locations of these are not yet known. New geological information is currently being obtained to assist with the analysis of the most suitable locations. This planning work is currently underway and due for completion by the 2nd week of June. DRDPIFR will be informed of these locations after the analysis has been completed. These new bores will be placed in strategic locations so that they are able to be used, along with the old bores, to facilitate the production of groundwater models and appropriate groundwater management strategies including preventing contaminated water entering Harahan's Creek. For past groundwater reports from NRETAS Maps, please refer to **Appendix C**.

3 WATER MANAGEMENT SYSTEMS

3.1 Water Use in Operations

Redbank mine is currently under C & M, and as such, water utilisation is minimal. For the term of this WMP, water will be used predominately for:

- Camp use,
- Cleaning and Maintenance,
- Drilling Operations,
- Road and airstrip works and
- Dust Suppression,

While the site is under C&M, water use at the mine site is negligible; with a minimum of four people (2 C&M staff and 2 camp caretakers) staying at the camp at any one time it is expected that water use at this location will be in the vicinity of 2500 – 4000 litres per day. The majority of this water is used for gardens, cooking, cleaning and hygiene.

The camp and airport upgrades planned for the 3rd quarter 2009 will require water for dust suppression and for construction purposes.

Drill rigs will require a minor water supply for their drilling operations during 2009.

During construction and exploration phases, the number of personnel on site may rise to 20, resulting in increased general water use of approximately 20,000L/day. The decommissioning of the current plant facility may also require the use of water for dust suppression and clean up.

Currently, water quantification is calculated using the known pump flow rate and the time period that the pump is in operation. Water quantification will begin in earnest after the upgrades to the existing facilities has occurred. This will involve water meters being placed on bores and tanks to more accurately understand the sites water usage.

During 2009, Redbank Mines is also aiming to lower the water levels in the existing Sandy Flat Pit so as to reduce the current environmental risk and impact associated with overflowing.

3.2 Water Management Infrastructure

The current water management infrastructure is as follows. This will be reassessed during 2009 to determine the usefulness of the existing infrastructure to the future operations and altered accordingly.

- **Sandy Flat Pit**
Currently, the Sandy Flat Pit is full of water and requires dewatering. The current process is to pump water from the pit to the tailings dam to increase the evaporation potential. It currently holds approximately 530 ML of acidic water with a copper concentration of approximately 600 mg/L.
- **Tailings Dam**
Has generally been an ephemeral water body but has had seepage problems in the past. This seepage has been known to enter shallow groundwater reserves, however more recent mitigation measures have corrected this (Searle, J. 2007). These include deeper trenches to capture underground seepage and prevention of water levels reaching seepage points.
- **Leach Vats**
- **The Pregnant Solution Pond (PSP)**
The PSP also contains acidic water and currently holds approximately 4750m³
- **Copper settlement ponds (2 of)**
Both settlement ponds have acidic water in them at the moment. Each pond has a capacity of approximately 950 m³ resulting in a total of 1900 m³ in the settling ponds.
- **The Baron Liquor Pond**
This pond also contains water to a depth of 3m. The volume of water held in this pond currently is 810 m³
- **Redbank Pit (ephemeral)**
Old pit that fills with water during rain events.
- **Seepage interception channels x2**
- **Clean water overpass**
Allows the runoff of clean uncontaminated water into Hanrahan's Creek.
- **Surface flow control bunds**
Directs uncontaminated surface flow from entering areas where contamination may occur and directing that flow off site.

The current plan for the water in the process ponds is to evaporate it out of the ponds, leaving behind the copper and other metals. This will allow the ponds to be utilized in the treatment of pit water. The pit water will be pumped to the ponds and treated with lime to raise the pH of the water. This will result in copper, iron and other minor metals being precipitated together with some gypsum. The solids will be removed by settlement in the ponds and in the TSF. This will result in a water quality suitable for release into Hanrahan's Creek. There are also leach vats on site containing water and ore of a quality similar to that of the heap leach. The water from these will be drained to the PSP and again allowed to evaporate or be treated in a similar manner to the pit water. If the liquids in the process ponds still hold contaminated fluids when the ponds are required for treating pit waters then the waters in the process ponds will be treated accordingly.

3.3 Water Balance

As mentioned in **Section 3.1**, for the majority of this reportable period, 4 personnel will be present on site while the facility is under C&M. This will result in the usage of approximately 4000 litres of water per day for cooking/cleaning and maintenance purposes. The camp currently has a 5000 litre tank on site and once used, the majority of this water eventually ends up in the septic system. The source of all water utilized in this fashion is from existing bores located at the camp.

The total water storage capacity at the plant is approximately 6500 m³ plus the pit water. The actual storage size of individual ponds is specified in **Section 3.2**. The Barron Liquor Pond contains copper laden acidic water that has been diluted by rainwater over the past wet season. The other ponds contain predominately rainwater with some residue acid and copper. These will be allowed to evaporate and will be treated if necessary over the coming months.

For the period of this WMP, there will be no inputs or outputs from these ponds for process purposes except possibly for the treatment of pit water. Water treatment volumes are currently being calculated so as to reduce the pit water level so that it will accept all surface and groundwater flows without expressing into Hanrahan's Creek through the palaeochannel.

A metallurgist has been to and inspected the site and as of the 28th of May 2009, the resin column will not be utilized in the process of cleaning the pit water. This is due to the large quantities of sulphuric acid required to run the column, as a result, without a leaching operation the acid must be neutralised and discarded. A new method of extracting the copper is currently being explored, including the simple treatment of pit water with lime to increase the pH to 5.5, resulting in the deposition of metals from the water. This will most likely take place in the existing ponds. Small scale tests will determine our ability to sufficiently reduce the level of metals in the water so that it may be released. Release of this water into the environment will be sought through the WDL.

A final plan for dewatering the Sandy Flat pit will be delivered to the DRDPIFR by August 1 2009.

3.3.1 Water Source Account

At this stage the water source account is largely unavailable. Rainfall data from October 2008 to January 2009 is known and the monitoring of this will continue as standard practice. For these four months, a total of 849.9mm of rain fell at the Redbank Mine area (**Appendix A**).

Water flow gauges will be installed in the future for further monitoring of water input and output as well as regular ground water monitoring to assist with this process.

3.3.2 Water State Account

Similar to the water source account, information regarding the water state account is largely unavailable. Efforts to rectify this will be made over the following 12 months in order to have more accurate readings for this in the future.

4 SURFACE WATER MANAGEMENT

The current situation at Redbank Mine is that the Sandy Flat Pit is the storage facility for all of the stormwater that falls on the site (**Figure 7**). This pit water and much of the stormwater contains high levels of copper, levels of other heavy metals and has a very low pH.

There is no planned production cycle for 2009, but instead, an exploration and drilling program, resulting in no pit water being required in the mineral extraction process. The pit is currently being dewatered via active evaporation until the final plan for treatment is determined.

An expert metallurgist has been engaged as a new member of the Redbank Board of Directors to lead this process with the aims of;

- Dewatering the pit to acceptable levels,
- Altering the pH to an acceptable level (pH 5.5) for release into the environment, and
- Recovering the copper so that the remaining water has copper (and other metals) at levels that are low enough and therefore at an acceptable level for release into the environment. (according to targets presented in **Table 1** in **Section 1.2**)

The entire water management system will be reviewed and revised so as to better manage surface water flows during the 2009/10 wet season.

Due to the ineffectiveness of the resin column, a contingency plan is currently under development. This plan will most likely utilise the existing lined ponds on the site to treat the water.

A thorough understanding of the level to which the pit water needs to be reduced to for it to contain the expected wet season inflows and not enter the palaeochannel will be known by the first of August 2009.

4.1 Potential Contaminants

The major potential contaminants that may enter natural systems as a result of current mine operations are:

- Copper
- Sulfuric Acid, and
- Sediment

The Department of Primary Industries, Fisheries and Mines (DPIFM – now DRDPFR) have also found high levels of Aluminium, Nickel, and Zinc in pit water suggesting that these too would be contaminating elements in the event of the pit overflowing (Edwards, C. 2008). Recent surface water testing by EcOz Environmental services also detected high levels of Magnesium and Iron in waterways surrounding the mine, suggesting that probably due to the number of shallow and outcropping metaliferous deposits in the vicinity, that these are locally naturally occurring levels of these substances.

As there are plans under development to treat the pit waters by raising the pH to around 5.5, (see **Section 4** above) it is expected that all metals, not just copper will fall from the solution, enabling simple separation of the liquids and the solids.

Studies into the composition of the tailings dam contents, waste rock dump, ROM pad and general use areas are underway in order to understand the acid and pollutant potential of these materials. Further investigations into the chemistry of the seepage trenches is planned as part of this study. This will be reported on during the 3rd quarter of 2009.

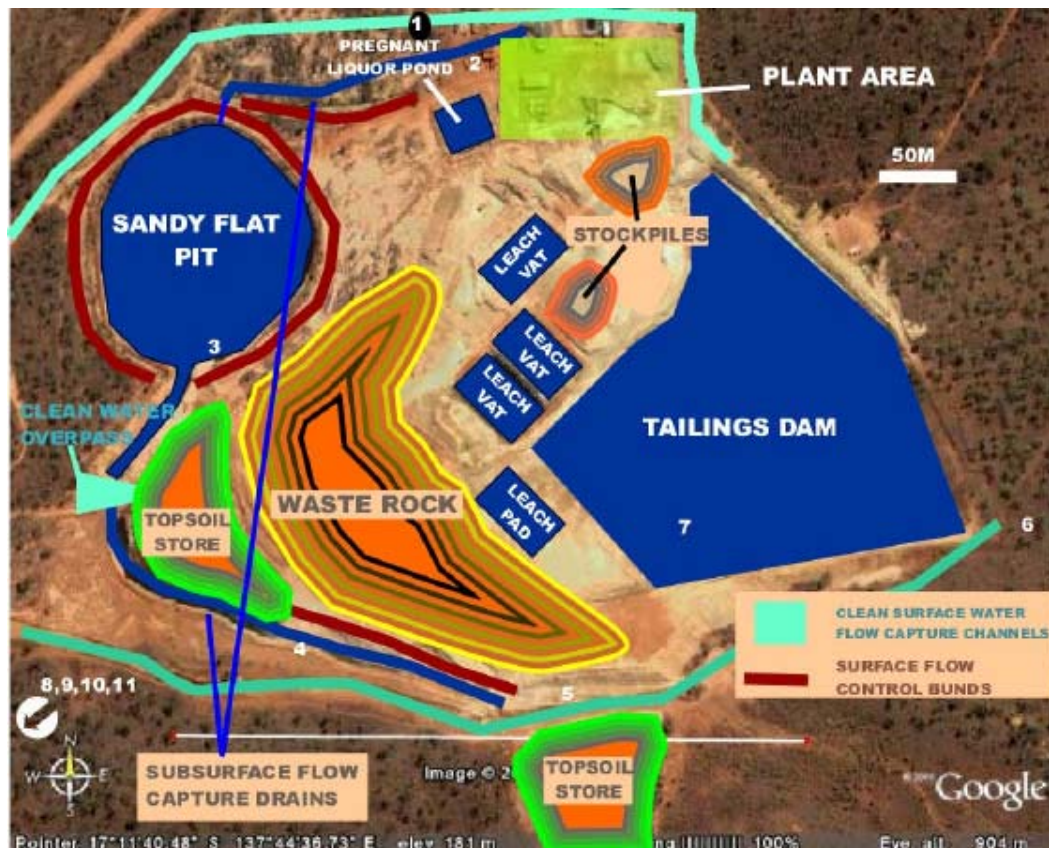
The Leach vats currently contain ore that is of a similar grade to that of the heap leach. The water from these will be emptied into the Pregnant Solution Pond and allowed to evaporate. The Leach vats will then store the remaining ore until it can be extracted or used after the plant upgrades are complete.

4.2 Potential Impacts

The Potential impacts associated with these contaminants is reduced stream health resulting is loss of aquatic plant and animal life. This may have longer term on-flow effects within the river catchment for higher order animal life, stock and human use if the contaminants are not prevented from leaving the mine site.

A study of macroinvertebrate abundance and community structure was performed by Eriss in 2008 and found differences between macroinvertebrate abundance and community structure between 'exposed' sites and reference sites suggesting that mining activity is having an effect on stream health. Further issues may include erosion and land degradation, loss of food sources, altered light permeation and water temperature (Humphrey. C, 2008).

4.3 Surface Water management Infrastructure



1. North High Flow Water Trench (NHFWT)
2. North Low Flow Water Trench (NLFWT)
3. Sandy Flat Pit (SFP)
4. South Low Flow Water Trench (SLFWT)
5. South High Flow Water Trench (SHFWT)
6. Start of High Flow Water Trench
7. Tailings Dam (TD)

Figure 7: Map of surface water management infrastructure at the Sandy Flat Pit and Plant Area. (Searle, J. 2007)

As depicted in **Figure 7**, the Northern and Southern high flow water trenches are designed to collect any uncontaminated surface water that lands in and around the mine site and funnel them off site via Hanrahan's Creek. The Northern and Southern low flow trenches collect potentially contaminated water which flows to the pit where it is stored until it can be treated. The Sandy Flat pit is currently full of copper laden acidic

water that will require treatment before being released. The Tailings dam is used as a means of increasing the rate of water evaporation in order to reduce the water levels in the Sandy Flat Pit. The clean water overpass allows the passage of clean uncontaminated water off site without requiring treatment first. The Surface flow control bunds assist with directing surface waters to the clean water overpass. Clean and treated water is discharged into the receiving waters in Hanrahan's Creek. This is a small ephemeral creek running just to the west of the existing mine site that eventually flows into Settlement Creek.

4.4 Discharge

The Sandy Flat Pit is currently full of water and in years of above average rainfall, the site has difficulty containing the large inputs of water. This has in the past resulted in discharges of water into Hanrahan's Creek, impacting on the conditions found in the downstream water ways today. As a result, RBM Operations is investigating methods to prevent further discharge of untreated water and therefore implementing water management plans and practices over the coming year.

4.4.1 Management of Surplus Water

Once the Sandy Flat pit is full, it can no longer accept inflows from the south drain and therefore results in overflows into the environment. A management strategy is currently being developed in order to prevent further overflows occurring in future years and will be supplied to DRDPIFR by August 1 2009. This management strategy is contingent on ground water monitoring and process plans. Monitoring bores are expected to be installed by the end of August 2009. A detailed water balance (of C&M activities) will be submitted to DRDPIFR by September 30 2009.

4.4.2 Discharge locations and management History

Contaminated water from the Sandy Flat Pit has been released into the receiving waters a number of times in the past. This has impacted the water quality and natural environment downstream of the mine.

Waters enter the natural environment either;

- Through the "palaeochannel" that results in pit waters entering Hanrahan's Creek via an underground flow and
- Direct overflow of the pit and/or Southern Low Flow Water Trench into Hanrahan's Creek.

Planning to prevent this situation from occurring during the 2008/9 wet season began during 2008 but was not completed as the Company encountered technical difficulties associated with the implementation of the ion exchange technology. New investment and management will hopefully ensure that nil unacceptable discharge occurs during the 2009/10 wet season by reducing the water levels in the pit to well below seepage points such as the palaeochannel.

The potential volumes of water discharged are unknown.

4.4.3 Discharge Water Quality

Sampling surface water in and around the Sandy Flat Pit, processing area and receiving waters showed that this water had very low pH levels. According to the Australian and New Zealand Guidelines for Fresh and Marine water quality 2000 (ANZECC 2000), slightly disturbed ecosystems in tropical Australia should have pH levels no less than 6.0. Reference sites within the region of the mine record pH levels between 6 and 8 regularly. In November, only one of the tested localities was within the acceptable pH levels. The majority of tested sites fell between pH 3 and pH 5.5. In the following three months, all tested sites were below a pH level of 6.0. The waters within the mine site and to a lesser extent, in the receiving waters had high levels of Copper (Cu). The ANZECC 2000 guidelines have a level of acceptance in fresh water ecosystems of 1.4 µg/L, while the National Environment Protection Measure 1999 require copper levels to be below 2.0 µg/L. The lowest reading of copper was found to be 0.09 g/L (90 000 µg/L, on site testing), significantly above the acceptable levels. For surface water results, please refer to **Appendix F**.

While these values were obtained on site, similar samples from surrounding water ways that were sent to ALS laboratories, a NATA accredited lab, had similar results. These tests, performed in March 2009, indicated that high heavy metal levels were common in the area due to previous mining activity. Not only Copper but also Aluminium, Manganese, Nickel and Iron were elevated when compared to the ANZECC Guidelines for Aquatic Ecosystems. It is known that the rivers and streams downstream of the mine have been affected by contaminated waters flowing from the mine site, resulting in these elevated levels. Some of these high levels may be naturally occurring however as they were detected in the reference sites. EcOz Environmental Services will manage all water monitoring programs and RBM Operations is committed to sending all surface and ground water samples to NATA accredited laboratories as required by DRDPIFR.

4.4.4 Waste Discharge Licence Requirements

The site has previously held a WDL. This has since expired and a new WDL is currently being sought. This WDL can be found in **Appendix I**.

(The WDL does not provide levels to compare discharges against, but rather requires monitoring and reporting)

4.5 Abstraction

Pit water has been utilised in the production cycle in the past however the site is currently in C&M mode. Pit water has over the course of the past wet season, been pumped around the site and into the Tailings Dam in a bid to increase evaporation so as to reduce the pit water levels. This has subsequently ceased at the onset of the dry season as the threat of overflow is no longer present and the movement of pit water to the TSF is not considered a satisfactory activity during the dry season. During the wet season a total of 720 000 litres of water was pumped into the tailings dam. (pump approximate capacity = 800 litres per minute and ran for a total of 15 hours). As plant upgrades progress, more detailed water measurement equipment and information will be utilized as specified in **Section 3.1**. This will allow for more detailed information on water movement around site.

4.6 Contingency Planning and Mitigation Measures

Current infrastructure is designed to maximise the reduction of uncontaminated water entering the site and the containment of contaminated water on site.

Clean water is diverted around the site using the Northern and Southern high flow water trenches. Surface water flow from suitable areas on site is directed across the clean water overpass and off site.

A metallurgist has been to and inspected the site and has deemed the resin column unsuitable for the purposes of dewatering the pit. Other methods of extracting the copper are currently being explored, including the simple treatment of pit water with lime to increase the pH to 5.5, resulting in the deposition of metals from the water. This will most likely take place in the existing ponds. Small scale tests will determine our ability to sufficiently reduce the level of metals in the water so that it may be released. Release of this water into the environment will be sought through the WDL. No pit or treated water is planned to be pumped into the TSF during this reporting period.

A final plan for dewatering the Sandy Flat pit will be delivered to the DRDPIFR by August 1 2009.

5 GROUND WATER MANAGEMENT

Impacts on the ground water in and around the Sandy Flat mine are unknown. A groundwater monitoring program is being developed and will be instigated as soon as trained staff can access the site. There is currently a known flow of subsurface water through the “palaeochannel” which expresses pit water into Harahan’s Creek. Whether this channel also feeds a groundwater resource is unknown.

5.1 Potential Contaminants

The main contaminants potentially entering groundwater are:

- Copper, and
- Sulfuric Acid

5.2 Potential Impacts

Ground water contamination has the potential to impact human and other uses that require bore water. The camp and mine sites currently have bores in place and ground water contamination may affect the use of these for mining purposes and operations.

Ground water feeds springs that provide important water supplies and wildlife refuges in the dry season. Due to the two distinct seasons experienced in the Redbank Mine region (See **section 2.1**), water sources can become rare and isolated. A great deal of the streams and creeks within the area are ephemeral and only flow during times of rainfall, i.e. the wet season. As a result, animals and also humans become restricted to the few remaining permanent water bodies. If the sources of this water, such as groundwater bores and springs are contaminated, a large proportion of animals and humans may be affected by this through illness or even death. Streams stemming from such springs may also have poor riparian vegetation and biota due to contaminated water, which can result in subsequent problems such as erosion and land degradation, loss of food sources, altered light permeation and water temperature (Humphrey. C, 2008).

5.3 Ground Water management Infrastructure

There are 12 usable bores on site according to NRETAS Maps. These bores were drilled between 1990 and 1994. Further processing and monitoring bores have also been drilled within the existing Sandy Flat pit and plant area. The majority of these have been regularly sampled and as a result, data has been supplied by the DRDPIFR. Due to the unknown accuracy of some of the bore data, a full list of active bores is unavailable until confirmation of these can be achieved. Some of the bores around the pit sites may be inaccessible or destroyed due to planned future works. As a result, extra bores may need to be drilled to replace these. Members of EcOz environmental services will conduct a search for these bores and will assess them for their availability when possible. For a list of bores, please refer to **Appendix B**.

5.4 Abstraction

Bore water has been used in the past for production purposes at Sandy Flat Mine site when stored, useable surface water levels were low. Bore water is likely to be required for processing in the future.

The camp also uses bore water for drinking, cooking and living purposes.

5.5 Contingency Planning and Mitigation Measures

An Environmental Monitoring Bore installation program for 2009 is currently being developed. The aim of this is to monitor the groundwater quality and to provide data so as to conduct hydro-geological studies to help map and understand the local groundwater resource and potential contamination sources.

The new management have committed to preventing any future flows into the palaeochannel and investigating the current impacts of the Sandy Flat Pit on the groundwater and the potential impacts of the proposed new pits on groundwater resources.

Over the period of the coming dry season (2009), water treatment processes will be implemented via the treatment of pit water. This will result in a significant reduction in pit water levels and continued water treatment during the 2009/10 wet season will allow RBM Operations Pty Ltd to keep the pit water levels below the level of the palaeochannel despite the high rainfall occurring over the wet season. Following this, plant upgrades will then assist with the further treatment and management of water levels occurring in the pit. As plans for this activity are due by the end of June, RBMO expect to put these plans into action during August in order to allow for at least 3 full months of water treatment prior to the onset of the 2009/10 wet season.

6 MONITORING

6.1 Statutory and Non-statutory Monitoring Programs

6.1.1 Surface Water

Current surface water monitoring is performed monthly. The locations of water sample sites are within the vicinity of the Sandy Flat pit and currently focus on Copper, pH and EC Levels. Water samples are occasionally sent to NTEL (NATA accredited) however this will be done on a more regular basis. On site water monitoring equipment is currently in the process of being upgraded and sample site locations are being expanded.

Surface water monitoring will take place monthly for the coming reportable period and reporting to DRDPIFR will be provided on a quarterly basis. Mid wet season sampling is difficult due to the restricted movement around the site due to the excessive rain. This program will aim to monitor the quality of water entering surrounding environments and ecosystems. Approximately 25 sites will be regularly tested for the parameters listed in **Table 5** in **Section 6.3.2**. For surface water sample methodology, please refer to **Appendix D**. Surface water sample sites can be seen in **Table 3**.

These sites have been selected for ease of comparison between unaffected (reference) areas and potentially contaminated sites. This will result in sites both upstream and downstream of mining processes (**Appendix E**). Sampling should be performed in accordance with the Rivers and Streams Sampling Australian Standards (ASNZS 5667.6-1998) and EcOz Environmental Services Surface Water Sampling Procedures (**Appendix D**).

Past monitoring has revealed high levels of Copper, Manganese, Aluminium, Cobalt, Zinc and Nickel. High levels of Sulfur have also been recorded in sediment samples and should therefore also be monitored. Due to high rainfall and the possibility of pit water flooding into receiving waters, ongoing monitoring is considered very important. Late in 2008 and early 2009, monitoring of pit waters and various sites in and around the Sandy Flat Pit were monitored and high levels of Copper and low pH's were recorded (see **Appendix F** for a summary of results). A list of proposed parameters is supplied in **Table 5** in **section 6.3.2**.

Table 3: Surface Water Sample Sites at Redbank Mine and Surrounding Water Ways

Site number	ID	Easting	Northing	Zone	Description
1	RC1	794226	8099937	53	Redbank Creek 1
2	RC2	795303	8100212	53	Redbank Creek 2
3	RC2A	796530	8100240	53	Redbank Creek 2a
4	RC3	797667	8100877	53	Redbank Creek 3
6	ECUS	789874	8095975	53	Echo Creek Upstream of Hanrahan's Creek
7	ECDS	789814	8095914	53	Echo Creek Downstream of Hanrahan's Creek
8	ECU12MC	788558	8093294	53	Echo Creek Upstream of 12 Mile Creek
9	12MUEC	788520	8093294	53	12 Mile Creek Upstream of Echo Creek
10	12MDEC	788585	8093243	53	12 Mile Creek Downstream of Echo Creek
11	12MC1	797379	8087456	53	12 Mile Creek 1
12	SC1	797475	8087360	53	Settlement Creek 1
13	SC2	797492	8087425	53	Settlement Creek 2
14	SC3	811786	8094051	53	Settlement Creek 3
15	BC1	183032	8094607	54	Branch Creek
16	7MC1	798569	8094238	53	7 Mile Creek.
17	TD	791880	8096866	53	Tailing Dam
18	SFP	791544	8096904	53	Sandy Flat Pit
19	SHFFC	791970	8096617	53	South High Flow Feeder Creek
20	SHFWT	791772	8096620	53	South High Flow Water Trench
21	SLFWT	791609	8096677	53	South Low Flow Water Trench
22	NHFWT	791915	8097276	53	North High Flow Water Trench
23	NLFWT	791740	8097191	53	North Low Flow Water Trench
24	HCRX	791030	8096853	53	Harahan's Creek at Rd Xing
25	HPRB	790930	8096731	53	Harahan's Pool at rock bar

6.1.2 Groundwater

There is currently no groundwater monitoring performed by RBMO. DRDPIFR monitors the existing six bores located around the Sandy Flat Pit area (See **Table 44, bores 1 and 13-17**) annually as an end of dry season program. DRDPIFR samples the groundwater for;

- Electrical conductivity;
- pH;
- Temperature;
- Aluminium;
- Cerium;
- Cobalt;
- Copper;
- Iron;
- Manganese;
- Nickel;
- Lead;
- Uranium;
- Zinc;
- Calcium;
- Magnesium;
- Sodium; and
- Potassium.

Groundwater monitoring will be carried out monthly at least for the first 12 months, from the date of the installation of the new bores (3rd quarter 2009), to test its quality within the area and to assess the impact (if any) that mining processes are having on the groundwater. This will be done using the methods described in **Appendix G** and reporting to DRDPIFR will occur on a quarterly basis. The parameters to be tested are those outlined in **Table 7** in **Section 6.3.3**. There are currently 12 active bores within the mining lease according to NRETAS Maps. The water from each of these bores was tested on their completion and was for the most part considered to be of good quality. In some instances, pH and Iron (Fe) were outside recommended aesthetical levels in the guidelines for drinking water quality in Australia 1987. For a summary table of the bore reports as supplied by NRETAS maps, please refer to **Appendix C**. DRDPIFR has supplied information on a further 5 bores leaving a total of 17 possible active bores. The majority of these are located around the Redbank and Azurite mine sites however there is approximately six located at the Sandy Flat pit and plant area and one at the mine camp. For bore locations, please refer to **Table 44** and **Appendix B**. The accuracy of this data is unknown and as a result, confirmation of the presence and availability of these bores will be sought. Additional EMB's will be installed during 2009 so as to improve and expand the groundwater monitoring and knowledge base as well as replace any bores that may become damaged due to proposed future works. Ground water flow directions are currently poorly known but the planned installation of new bores will result in the development of a hydrogeological model for the area. This work is underway and once this information becomes available, DRDPIFR will be informed immediately. Sampling procedures will be in accordance with the Australian Standard on Groundwater Quality Sampling (ASNZS 5667.11-1998) and EcOz Environmental Services Groundwater Sampling Procedures (**Appendix G**).

Table 4: Existing Bore Locations at Redbank Mine

Bore	Easting	Northing	Registration Number
1	791300	8096900	27473
1a*	791300	8096900	27474
2	792400	8097800	27472
3	792700	8098400	29528
4	792800	8098410	28427
5	793290	8098489	28420
6	792900	8098700	28428
7	792920	8098810	28424
8	792994	8098800	28422
9	793100	8098800	29527
9a*	793100	8098800	29526
10	793206	8098709	28426
11	794090	8099020	28421
12	792500	8099400	29526
13	791610	8096920	GW_EPB
14	791492	8097088	GW_MWPB
15	791529	8097108	GW_NPB
16	791667	8097076	GW_OPLB
17	791819	8097244	GW_PARB

* Bores 1 and 1a are potentially the same bore as are bores 9 and 9a. A great deal of uncertainty is currently associated with these bores and EcOz Environmental services will be assessing the presence of these bore over the course of the 2009 dry season in association with the development of the groundwater management strategy and the initial sampling of the newly installed EMB's. Bores 1a and 9a do not feature on the bore location map in **Appendix B**.

6.1.3 Biological

Macroinvertebrate sampling is currently performed in March each year as this is the only time when the sites are both accessible and flowing. Macroinvertebrate sampling was first conducted in March 2008 to assess the stream health (via macroinvertebrate abundance and community structure) in the surrounding water ways, providing detailed baseline results for the Redbank Mine area. This involves taking kick samples at 16 sites (**Table 5** and **Appendix H**). Two kick samples are taken from each site, one from a riffle section and one from an edge habitat. This is done so as to provide the best representation of the macroinvertebrate community at each location as possible. Samples are collected and preserved and returned to Darwin for sorting and identification.

The 16 selected sites include reference sites that allow for direct comparisons between potentially contaminated sites and unaffected sites.

Since the Creeks and rivers in this area are ephemeral, sampling is restricted to times of flow. The best time for this is late in the wet season when all creeks are flowing. Sampling should be in accordance with the AUSRIVAS Protocol.

All sites in **Table 5** were sampled in 2008 and the results show clear distinction between 'reference' sites and 'exposed' sites, indicating that mine operations and contaminants are impacting downstream communities of macroinvertebrate (Humphrey, C, *et al.* 2008).

As there has been no change in conditions either positive or negative since the 2008 biological survey, only sites 1-4 in **Table 5** were sampled in 2009 to collect further baseline macroinvertebrate sampling data of the currently un-impacted Redbank Creek system.

Further biological surveys of impacted sites are planned for 2010, once improvements in the water management activities have occurred. Ongoing annual monitoring plans will be developed according to the new activities on the site.

Table 5: Macro-invertebrate Sampling Locations

Site number	ID	Easting	Northing	Zone	Description
1	RC1	794226	8099937	53	Redbank Creek 1
2	RC2	795303	8100212	53	Redbank Creek 2
3	RC2A	796530	8100240	53	Redbank Creek 2a
4	RC3	797667	8100877	53	Redbank Creek 3
6	ECUS	789874	8095975	53	Echo Creek Upstream of Hanrahan's Creek
7	ECDS	789814	8095914	53	Echo Creek Downstream of Hanrahan's Creek
8	ECU12MC	788558	8093294	53	Echo Creek Upstream of 12 Mile Creek
9	12MUEC	788520	8093294	53	12 Mile Creek Upstream of Echo Creek
10	12MDEC	788585	8093243	53	12 Mile Creek Downstream of Echo Creek
11	12MC1	797379	8087456	53	12 Mile Creek 1
12	SC1	797475	8087360	53	Settlement Creek 1
13	SC2	797492	8087425	53	Settlement Creek 2
14	SC3	811786	8094051	53	Settlement Creek 3
15	BC1	183032	8094607	54	Branch Creek
16	7MC1	798569	8094238	53	7 Mile Creek.

6.2 Quality Control

6.2.1 Sample Collection and Dispatch

Past monitoring has been performed on site and less frequently have the results been confirmed by a NATA accredited laboratory in Darwin. RBM Operations Pty Ltd is currently revising all tested parameters and will be conducting monthly surface and groundwater sampling over the coming wet season. EcOz Environmental Services will be managing this water monitoring programs and will be using appropriate NATA certified laboratories to perform the analysis. Surface water sampling will be restricted to sites that are accessible. It is expected that movements between Redbank and Darwin will be less of an issue during the 2009/10 wet season as airstrip upgrades are due to be performed this dry season.

6.2.2 Calibration of Field Instruments

Field instruments are calibrated prior to each set of samples being taken. EcOz will audit the sampling program and ensure there is a fresh supply of calibration fluids and that the procedures are performed correctly.

6.2.3 Sample Analysis

Samples are to be analysed by a National Association of Testing Authorities (NATA) accredited laboratory, employing approved methods in terms of *Schedule B(3) Guideline on Laboratory Analysis of Potentially Contaminated Soils, National Environmental Protection (Assessment of Site Contamination) Measure (NEPC, 1999)*. NATA endorsed laboratory reports, including Sample Receipt Notifications, Certificates of Analysis, Quality Control Reports and Interpretive Quality Control Reports are to be provided.

Laboratory QA/QC is to include, over and above internal reviews prior to finalizing the laboratory reports and further analysis to determine whether errors have been made, surrogates, duplicates, method blanks, laboratory control and matrix spikes, parameter frequencies and summaries of outliers.

NT Laboratories will be used where possible. EcOz prefer to use ALS Laboratories in Brisbane for samples that cannot be analysed locally.

There are 3 methods that will be used as Quality Assurance and Quality Control Methods (QA/QC) in the Field.

- A split sample will also be taken. This sample will be sent to a different laboratory than the one performing the rest of the analysis
- A duplicate sample will be taken. This involves taking two samples at one site but labelling them differently. There should be no difference between these samples and any difference should be investigated, and
- Blank samples will be taken. This involves washing the sampling gear three times. First, the equipment is rinsed in de-mineralised water. It is then washed in deionised de-mineralised water and then rinsed in de-mineralised water again. A sample of the de-mineralised water is then sent for testing to assess the efficiency of cleaning the equipment between samples.

6.2.4 Data Storage and Verification

EcOz Environmental Services are to take the lead role in managing monitoring data. EcOz maintains a quality management system that includes the storage and backup of data on daily, weekly and monthly timeframes. All data is backed-up each night allowing for the safe storage of all relevant information important to EcOz and their Clients.

6.3 Water Quality Trigger values

EcOz will endeavour to establish a suitable baseline of water quality during 2009. This will then be compared with the ANZECC Guidelines mentioned below so that an acceptable local standard can be determined.

6.3.1 Level of Protection

The Redbank mining lease lies within the Wollogorang station. Wollogorang station was established as a pastoral lease in the 1800's and is used for the same purpose today. Both cattle and sheep have been stationed within the lease but the main stock today is cattle.

There are a number of possible aboriginal heritage sites within the vicinity of the Redbank mining lease and while these are not currently listed as sites of conservation significance, it is likely they will in the future. Two areas associated with the mine site are of possible European heritage significance. These are Masterton's Cave and Masterton's Grave. William Masterton lived and worked within the mine lease from 1916 to 1961.

The Mining lease lies within the Settlement Creek catchment which has three listed beneficial uses. These beneficial uses include Environment, Riparian and Cultural. These have been designed to protect and sustainably manage the water resources within the Settlement Creek catchment and as such, the area has the highest level of protection based on the beneficial uses.

The Australian and New Zealand guidelines for marine and freshwater quality recognise three ecosystem conditions, high conservation/ecological value, slightly to moderately disturbed systems, and highly disturbed systems. Considering the level of pastoralism in the area, and the past mining activity, the area surrounding the Redbank mining lease could be considered to be slightly to moderately disturbed. As such, a 95% level of protection (ANZECC guidelines 2000) should be used.

6.3.2 Surface Water

Table 5: Relevant guidelines for Surface water monitoring and comparison

Parameter	Aust Drinking water Guidelines (mg/L)	Aust Guidelines for Fresh and Marine Water Quality, Aquatic ecosystems, 80 % protection (µg/L)	Aust Guidelines for Fresh and Marine Water Quality, Aquatic ecosystems, 95 % protection (µg/L)	Aust Guidelines for Fresh and Marine Water Quality, Primary Industry, 95% protection (µg/L)
Calcium	NA	NA	NA	NA
Potassium	NA	NA	NA	NA
Magnesium	NA	NA	NA	15000
Sodium	180*	NA	NA	NA
Aluminium	2 [#]	150 [^]	55 [^]	30 [^]
Cobalt	NA	#	#	NA
Copper	2	2.5	1.4	5
Iron	0.3 [#]	#	#	10
Manganese	0.5	3600	1900	10
Nickel	0.02	17	11	100
Lead	0.01	9.4	3.4	1-Jul
Uranium	0.02	#	#	NA
Zinc	3	31	8	5
Cadmium	0.002	0.8	0.2	0.2-1.8
Sulfate	500	NA	NA	>1000 mg/L
Sulfide	NA	NA	NA	NA

* Aesthetic value only

Insufficient data to produce health levels

[^] For a pH > 6.5. The ANZECC Guidelines specify there is insufficient data for a pH <6.5

NA Not available

Temperature, pH, and Electrical Conductivity should also be tested in the field.

New water sampling equipment that will perform field tests of temperature, pH, electrical conductivity and turbidity is being sourced and will be in place prior to the first rains of the 2009/10 wet season.

Surface waters within the area are predominately ephemeral resulting in seasonal flows within streams. As a result, release of contaminants into receiving waters accumulates until sufficient flows are generated to dilute these contaminants. Therefore, water released from site should be treated to levels suitable for the surrounding environment.

RBM Operations have devised a list of response values that are considered appropriate to the environmental conditions experienced in the Redbank Area. These are outlined in **Table 67** below.

Table 6: Proposed Limits for Water Sampling At Redbank Mine

Limit	Value
Focus	ANZECC Guidelines 95% protection level based on local conditions
Action	ANZECC Guidelines 80% protection level based on local conditions
Upper	50 % of current conditions

The 2009 plans to reduce the Sandy Flat Pit levels to a point so that it will accept all wet season surface flows without expressing into the palaeochannel, along with hydrogeological studies to understand the groundwater flows will provide us with a thorough understanding of our ability to set solid targets beyond 2010.

As specified in **Section 1.2**, RBM Operation Pty Ltd has set a time frame, by which time it is hoped that these targets will be achieved. This will be a lengthy and ongoing process.

6.3.3 Groundwater

Table 7: Relevant guidelines for Groundwater monitoring and comparison

	Australian Drinking water Guidelines (mg/L)	National Environment Protection Measure 1999, Freshwater aquatic systems (µg/L)	National Environment Protection Measure 1999, Livestock (mg/L)
Calcium	NA	NA	1000
Potassium	NA	NA	NA
Magnesium	NA	NA	NA
Sodium	180*	NA	NA
Aluminium	2.0 [#]	100 [^]	5.0
Cobalt	NA	NA	1.0
Copper	2.0	2.0-5.0	0.5
Iron	0.3 [#]	1000	NA
Manganese	0.5	NA	NA
Nickel	0.02	15-150	1
Lead	0.01	1.0-5.0	0.1
Uranium	0.02	NA	NA
Zinc	3.0	5.0-50.0	20
Cadmium	0.002	0.2-2.0	0.01
Sulphate	500	NA	NA
Sulphide	NA	NA	NA

* Aesthetic value only

Insufficient data to produce health levels

[^] For a pH > 6.5. The ANZECC Guidelines specify there is insufficient data for a pH <6.5

NA Not available

Temperature, pH, and Electrical Conductivity should also be tested in the field.

The majority of rivers and streams within the settlement creek catchment are ephemeral and only flow for a maximum of 6 months of the year. This may be due to little interaction between the groundwater and surface waters. Despite this, a number of natural springs in the area result in continued groundwater and surface water mixing. As a result, any groundwater contamination could potentially have lasting effects if it is utilised

by humans or ecosystems after rising to the surface from bores or natural springs. With this in mind, a high degree of stringency should be employed when dealing with ground water contamination and tested parameters.

Since bore water will be used for both camp cooking, drinking and cleaning as well as mine operations and processes, it is possible that two sets of trigger levels may be utilised within the same mining lease site.

6.3.4 Application of Trigger Values and Incident Reporting

If water samples are found to exceed the appropriate trigger levels, without an obvious source, a more extensive sampling program would be performed to locate the source of the contamination. Once this is located, an action plan can be implemented to stop or reduce the contamination. Ongoing monitoring will indicate changes in levels of any contaminants entering natural systems so immediate action can be taken if required. Upon discovering an increase in contaminant levels, an immediate investigation of all known release sites would be performed. Once the source of the issue is located, immediate action would be taken to isolate and prevent the contamination from entering the natural system, thus preventing further damage. Efforts would then be made to remedy the situation and return the site back to normal operating levels.

Monitoring data will be supplied to regulatory authorities via the licensing requirements and samples that trigger pollution reporting levels will be reported immediately.

7 REPORTING

Redbank Mines are required to report on water and pollution events and monitoring through;

- This Water Management Plan
- The Mining Management Plan
- The Waste Discharge Licence
- The Pollution Hotline

Redbank Mines are developing an EIS for the expansion of the operations at Redbank. This EIS will document the proposed management activities to deal with the existing environmental legacy issues that have been inherited with the site, as well as the management plans for dealing with the proposed new activities at the site, including processing facilities, new pits, waste and ore dumps and associated infrastructure.

Water quality data is currently being sought from NTEL, however obtaining this information has proved difficult. High levels of metals as discussed in **Section 4.1** have been observed in recent years. Water quality downstream from Sandy Flay Pit has varied depending on the annual rain levels, as this affects the possible pit breaches into Hanrahan's Creek and therefore the contamination levels experienced. These breaches have occurred in the past resulting in contamination of Hanrahan's and other creeks downstream. It is planned that the dewatering of the pit will assist in preventing future pit breaches and current hydrogeological analysis and Digital Terrain Mapping will assist in the understanding of water movements and allow solid management strategies to be developed and implemented. Such strategies will be delivered to DRDPIMF by August 1 2009. RBM Operations Pty Ltd is committed to improving their water quality data through the improved monitoring training, procedures, and equipment. Whilst monitoring to date has resulted in an ongoing knowledge of the Sandy Flat area, this will be expanded upon in a number of ways.

1. Collation and analysis of historic data is underway and results will be used to help direct future monitoring plans.
2. Sample sites and locations of monthly sampling events will be expanded to gather more information about not only the water quality in the direct vicinity of the Sandy Flat Pit but also in the surrounding catchments and sub-catchments.
3. Sampling equipment will be upgraded and research is currently underway to assess the most appropriate and feasible options so as to better improve the accuracy of information gathered during sampling events.
4. On site staff will be trained in the proper sample methodology so as to maintain continued approved sampling procedures. This will also allow for more accurate data collection
5. Improved QA/QC procedures will be developed and implemented as a means to guarantee the quality of the data
6. Samples will be regularly sent to a NATA accredited laboratory for analysis.

8 STRATEGIC PLANNING

The Redbank site has been placed into C & M for 2009. During this year an EIS will be developed for the expansion of the copper operations at Redbank. This EIS will act as a strategic planning document to propose solutions to the existing environmental legacy issues that have been inherited with the site, as well as the management plans for dealing with the proposed expansion activities.

Water management strategies to date have largely consisted of diverting all water that lands on site to the Sandy Flat Pit. This has resulted in the conditions we see on site today. Subsequently, a number of water treatment strategies have focused on the reduction of water in the Sandy Flat Pit as a means to manage wet season rain events. Thus far, efforts to do this have not been largely successful, however, RBM Operations Pty Ltd hope to rectify this over the coming months.

During the coming year, RBMO will develop and implement a realistic and achievable water management strategy that will result in the successful reduction of water level in the Sandy Flat Pit. It is hoped that this will be achieved through the treatment of pit water so as to extract suspended metals from the water and increase the pH levels at the same time. It is believed this will reduce the contamination of this water to an acceptable level for release. After the 2009/10 wet season, the water management strategy will be evaluated and updated if necessary to improve its effectiveness and cope with new conditions on site.

Activity (2009/10)	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Finalise water management Plan												
Implement water management plan												
Reduction of pit level to acceptable level												
Continued treatment and assessment of Water management												
Re-evaluate and update management plan to suit new conditions												

9 GLOSSARY AND ABBREVIATIONS

Units of Measurement

µg/L	Micrograms per litre
mg/L	Milligrams per litre
pH	measures of acidity (< 7) or alkalinity (> 7)
mm	millimetres
km/hr	Kilometres per hour
km ²	Square kilometres

Chemical symbols

Al	Aluminium	Ca	Calcium
Cd	Cadmium	Co	Cobalt
Cu	Copper	Fe	Iron
K	Potassium	Mg	Magnesium
Mn	Manganese	Na	Sodium
Ni	Nickel	Pb	Lead
U	Uranium	Zn	Zinc

Abbreviations

BOM	Bureau of Meteorology
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
C & M	Care and maintenance
DTM	Digital Terrain Model
EMB	Environmental Monitoring Bore
MMP	Mine Management Plan
HCRX	Hanrahan's Creek Road Crossing
HCRB	Hanrahan's Creek Rock Bank
NHFWT	North High Flow Water Trench
NLFWT	North Low Flow Water Trench
NTEL	Northern Territory Environmental Laboratories
PAH	Polycyclic Aromatic Hydrocarbons
SFP	Sandy Flat Pit
SLFWT	South Low Flow Water Trench
SHFWT	South High Flow Water Trench
TD	Tailings Dam
TPH	Total Petroleum Hydrocarbons
WDL	Waste Discharge Licence
WMP	Water Management Plan

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APPENDIX A

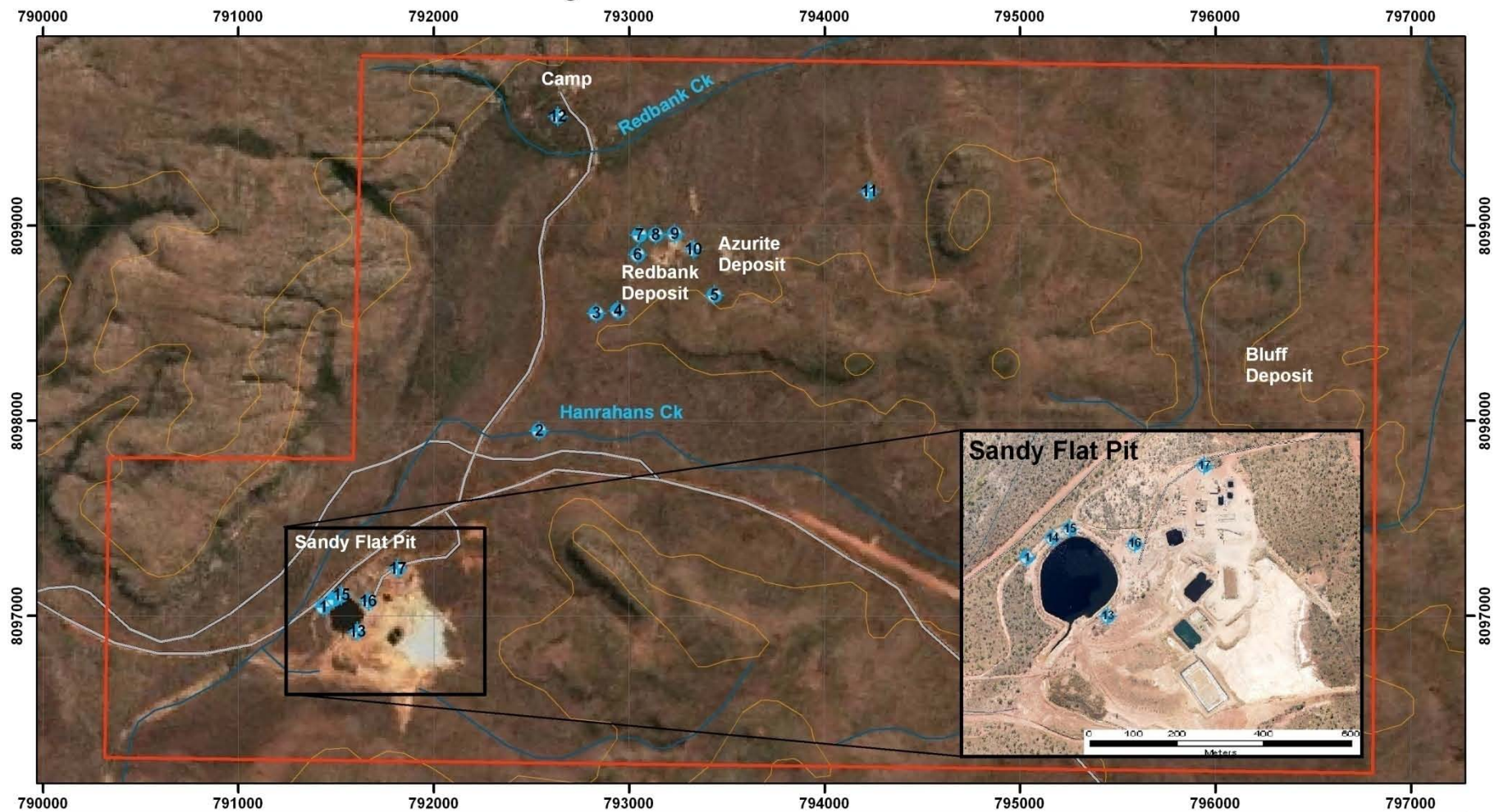
**Rainfall readings from the Redbank Mine
rain gauge, October 2008 – January 2009**

Date	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	
1	0	0	0	54.2	2	0	
2	0	0	0	41.4	31	0	
3	0	0	0	15.2	31.2	0	
4	0	0	0	42	10.4	0	
5	0	0	0	2.6	0	0	
6	0	0	0	0	21	0	
7	13.6	0	0	28.2	21	0	
8	0	0	0	65.4	11.2	0	
9	0	0	0	10.5	4	0	
10	0	0	4	20.2	0	0	
11	0	0	0	6	22	0	
12	0	0	27.5	0	0.6	0	
13	0	4.4	31.7	0	0	0.2	
14	0	0	0	0	0	0	
15	12	0	6.8	0	0	0	
16	0	0	0	9	0	0	
17	4.2	0	0	5.8	0	0	
18	7.9	0	0	1.2	0	0	
19	0	0	3.6	9.6	0	0	
20	0	12	0	31	0	0	
21	0	33	0	1.6	0	0	
22	0	12.2	0	5.6	0	0	
23	0	29	12	44	0	0	
24	0	0	0	1.4	15.6	0	
25	0	0	0	18.8	9	0	
26	0	16	0	37.4	15	0	
27	0	0	0	46	26.6	0	
28	0	24	0	5.4	0	0	
29	0	0	0	0	-	0	
30	0	2	3.4	49.3	-	0	
31	0	-	26	12.8	-	0	Total
Total	37.7	132.6	115	564.6	220.6	0.2	1070.7
No of Rain Days	4	8	8	25	14	1	60

APPENDIX B

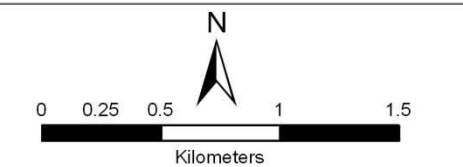
Map of Bore Locations

Monitoring Bore Locations at Redbank Mine



- RBM Bore Locations
- Contours
- Roads
- Watercourse lines
- RBM lease Boundary (estimate)

Background Satellite Imagery from Google Earth, January 2009
Zoomed area from Aerial photography provided by Redbank Mine



MAP PROJECTION: GDA94 (UTM), Zone 53



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24th, February 2009

APPENDIX C
Tabulated Bore Information (From Bore
Reports)

Bore Name	Sandy flat bore 2	Sandy Flat bore 1	Access road bore 1	3/94	8/93	1/93	9/93	5/93	3/93	2/94	1/94	7/93	2/93	5/94
Bore Numbers	1	1a	2	3	4	5	6	7	8	9	9a	10	11	12
Registraion Number	27473	27474	27472	29528	28427	28420	28428	28424	28422	29527	29526	28426	28421	29530
Completion Depth	42	42	42	72	78	89	30	72	60	72	64	78	54	60
Completion Yeild	2	2	2.5	2	2.5	2.5	2	3.5	5	10	1.4	5	2.5	10
pH	8.2	7.7	7.8	8.2	7.5	5.7	5.4	7.9	7.7	8.3	5.9	7.9	7.1	8.2
EC	375	375	375	368	353	211	23	348	319	370	24	354	162	197
TDS	225	230	215	219	210	177	31	197	179	223	53	195	150	132
Sodium	7	7	8	6	7	12	3	7	5	5	3	6	5	4
Potassium	9	9	9	7	9	14	1	7	7	8	4	7	10	16
Calcium	27	27	30	23	28	5	<1	30	24	27	<1	30	6	18
Magnesium	26	26	23	18	24	8	1	23	25	17	<1	26	10	10
Iron	0.6	u/s	0.8	15.4	5.9	u/s	u/s	2.1	9.9	5	37	4.4	u/s	1.3
Total Hardness	175	175	169	132	169	45	4	170	163	137	<1	182	56	86
Total Alkilinity	190	185	189	185	148	11	2	177	165	191	2	184	28	96
Silica	30	28	26	29	20	45	16	28	31	31	24	30	51	24
Chloride	5	5	5	7	9	7	6	8	6	7	8	7	6	6
Sulphate	12	16	10	16	34	64	1	11	10	13	5	11	43	6
Nitrate	<1	3	<1	<1	1	<1	1	<1	<1	<1	<1	<1	<1	<1
Bicarbonate	232	225	231	225	181	14	2	216	201	233	3	224	34	117
Carbonate				0	0	0	0	0	0	0	0	0	0	0
Hydroxide				0	0	0	0	0	0	0	0	0	0	0
fluoride	0.1	0.1	0.2	0.3	0.2	0.5	0.1	0.2	0.4	0.1	0.1	0.2	1.1	0.1
NaCl	8	8	8	12	15	12	10	13	10	12	13	12	10	10

APPENDIX D

EcOz Environmental Services Surface Water Procedures



Surface water Sample Procedure

Objectives	To ensure that the sampling method utilised provides surface water samples that are representative of the actual composition, both spatial and temporal site.
Quality Hazards	• Contamination - To minimise sample contamination: • Ensure sample bottles have been obtained from a NATA Accredited laboratory. • Ensure equipment is cleaned thoroughly after each sample with demineralised water. • Ensure samples are tightly sealed, stored upright and are cooled using ice bricks and bags of ice. • Field instrument calibration – Probes must be calibrated before each sampling event.
PPE Requirements:	 Long sleeved shirts and trousers are required to be worn on site.
References	AS/NZS 5667.1:1998 Water Quality – Sampling. Part 1. Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples. AS/NZS 5667.10:1998. Water Quality-Sampling Part 10 Guidance on Sampling of Waste Waters.

Notes:

Smoking in the field is not permitted.

To prevent contaminating the sample, keep hands away from the opening of the sampling bottle during sampling.

Put the lid on the sample and shake immediately (for bottles that contain preservatives) after the collection. Place water samples in cooler with ice to maintain a cool environment.

Samples have to be at TNT Freight couriers the same day as sampling, no later than 4pm to be freighted to the lab.

Do not touch the open bottle. Keep bottles clean to prevent contamination

Do not allow bottle lids to touch the ground. Keep lids clean to prevent contamination.

Do not allow water to overfill the bottle, particularly not for sample bottles with preservative.

Procedure

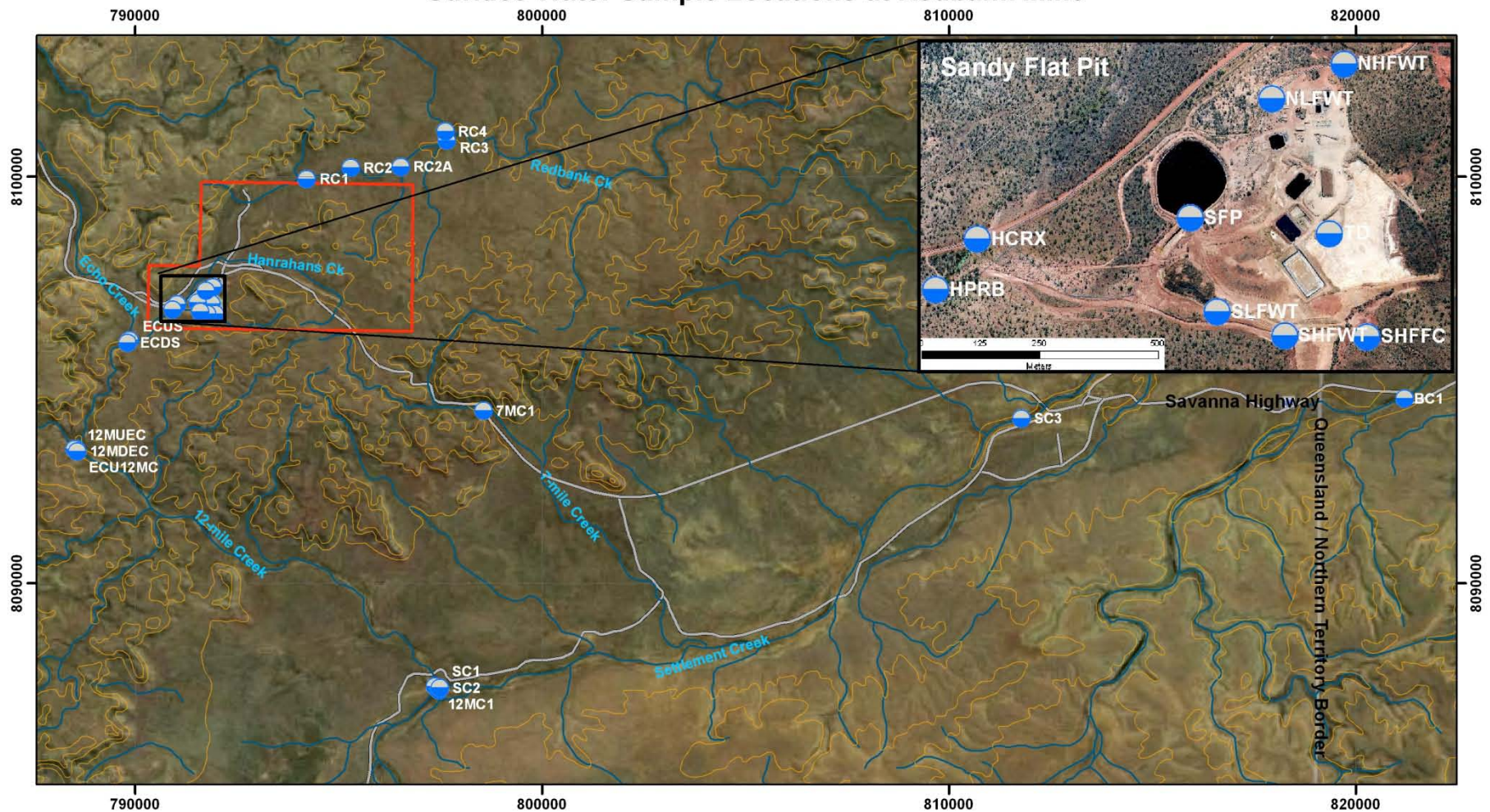
Step	Action	Comment
1.	Surface water Preparation	
2.	Equipment • Powder-free gloves • Appropriate bottles for sampling • Esky • Ice bricks • Pen/ paper for recording • Demineralised water to clean equipment • Small jug • Temperature, electrical conductivity and pH meter	
3.	Sampling Procedure at Stormwater Pit Phase 1: • Make sure all bottles are labelled correctly, chain of custody forms are filled out and freight documents are ready to go. • Make sure all ph, temperature and electrical conductivity meters have been calibrated, have spare batteries and are working • Make sure that the ice bricks are frozen and in the esky • Wear gloves • Find a spot where the bottle can be completely immersed in the water (NOTE: This is only for bottles without preservatives in them) • Make sure that there is no debris, plant life in the way • If you can reach out to a clear spot from the edge do so, if not then stand down stream of the sample site • Lay out all bottles on the esky lid with their caps on. Do not put bottles directly on a hot surface. • Place a small jug on esky lid • Take the first bottle, unscrew lid and fill to the top trying to reduce the number of air bubbles. (NOTE: For Dissolved Heavy Metals Filtering will be required) • For the bottles with preservatives, fill the small jug • Transfer the water from the jug into the bottles making sure the lid edges do not touch. Be careful not to over fill the bottles as some contain preservatives. • Re-screw the lid back onto the bottle and place the bottle in the esky. • Be sure not to touch the lip of the lids with fingers • Fill the remaining bottles and place in esky • Fill the small jug • Take out the pH, temperature and electrical conductivity meters • Record the results. Phase 2:	

Step	Action	Comment
	Rinse all meter probes, small jug and other equipment with decon and demineralised water solution.	
4.	Field Duplicates For every 10 sample taken, 1 field duplicate needs to be taken. The Field Duplicates test the methods used for collection in the field and the laboratory analysis. - Pick a sample site at random (generally a site upstream or downstream of main sample area. Alternate between upstream and downstream if more than 1 field duplicate is required) - Take samples as normal following Phase 1 through Phase 3 - Once normal site sample is completed collect extra bottle set - Label the bottles with a code not related to the site number (eg: If you are at site 5 and there are 20 sample sites in total, call this field duplicate site 21) - Collect samples like normal following Phase 1 through Phase 3.	
5.	Split Samples For every sample event a split sample needs to be collected. The Split sample is sent to another Laboratory. This is to test the Laboratory analysis. - Using the same method as the field duplicates pick, at random, one of the sample sites - Take samples as normal following Phase 1 through Phase 3 - Once normal site sample is completed collect extra bottle set - Give the bottles the name 'Split'. The lab it is sent to will know that it is a split field sample - Collect samples like normal following Phase 1 through Phase 3.	
6.	Rinsate Blank Samples For every sample event a rinsate blank needs to be collected. The Rinsate Blank sample is to test the field methods and quality control of cleaning equipment in the field. - Once finished all site samples wash all equipment with the decon demineralised water solution - Wash a second time - Rinse thoroughly with demineralised water - Pour demineralised water into the jug used during water sampling - Using this fill all sample bottles for testing - Label bottles rinsate - Send off to the lab as normal.	
7.	TPH, PAH and BTEX These samples are required to be obtained from the surface of the water body. Bottles are to be filled as much as possible with an attempt to leave no air in the sample.	<i>Bottle selection:</i> TPH (C6-C9) and PAH – 1L solvent washed amber glass bottle with Teflon lined cap. TPH (C10-C36) and BTEX – 2 x 40 ml

Step	Action	Comment
		hydrochloric acid preserved glass vials. Ensure sample date, time, person sampling and location number are clearly marked on the bottle label.
8.	Nutrients These samples are required to be obtained from just below the surface of the water. Bottles are to be filled as much as possible with an attempt to leave no air in the sample.	<i>Bottle selection:</i> 1L unpreserved plastic bottle with plastic cap. Ensure sample date, time, person sampling and location number are clearly marked on the bottle label.
9.	Total Heavy Metals These samples are required to be obtained from just below the surface of the water. Bottles are to be filled as much as possible with an attempt to leave no air in the sample.	<i>Bottle selection:</i> 250 ml nitric acid preserved clear plastic bottle. <i>NOTE: For dissolved metals field filtration is required.</i> Ensure sample date, time, person sampling and location number are clearly marked on the bottle label.
10.	Cleaning of Equipment Between each sampling site, equipment is required to be cleaned with demineralised water.	
11.	Bottle Transportation Bottles are to be stored to ensure they stay upright in eskies during transport. Bottles are to be packed with ice bricks to ensure they remain chilled whilst on route to the laboratory.	

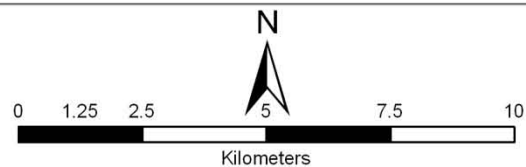
APPENDIX E
Map of Surface Water Sample Sites

Surface Water Sample Locations at Redbank Mine



-  Surface Water Sites
-  Watercourse lines
-  Redbank Mine Boundary (approx)

-  Contours
-  Roads



MAP PROJECTION: GDA94 (UTM), Zone 53/54



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3rd, February 2009

Satellite Image from Google Earth, February 2009

APPENDIX F

Surface Water Sample Results

Redbank Mine Surface Water Sampling Dashboard as of July 2009

The Parameters listed on the Dashboard are results that have triggered the ANZECC Guidelines for Aquatic ecosystems freshwater 80% species level.

Sampling undertaken by ALS and NTEL is to N.A.T.A standards.

NTEL

ALS

Redbank

Site 1	Unit	Limit	16-Jun-09
Copper	mg/L	0.0025	0.0142
Aluminium	mg/L	0.15	0.217

Site 2	Unit	Limit	16-Jun-09	16/06/2009 (DUP)
Copper	mg/L	0.0025	0.00313	0.00287

Site 3	Unit	Limit	25-Mar-09	May-09	16-Jun-09	13-Jul-09
Cadmium	mg/L	0.0008	0.0017	*	*	0.0062
Copper	mg/L	0.0025	*	1070	*	1170
Aluminium	mg/L	0.15	*	*	0.2	523
Manganese	mg/L	3.6	*	*	*	47.4
Nickel	mg/L	0.017	*	*	*	8.42
Zinc	mg/L	0.031	*	*	*	12.6

Site 4	Unit	Limit	25-Mar-09	May-09
Copper	mg/L	0.0025	0.003	867

Site 5	Unit	Limit	22/11/2008	31/12/2008	21/01/2009	22/02/2009	Feb-09	Mar-09	21-Apr-09
Copper	mg/L	0.0025	120	110	90	120	0.0114	90	70

Site 6	Unit	Limit	22/11/2008	31/12/2008	21/01/2009	22/02/2009	Feb-09	Mar-09	25-Mar-09	21-Apr-09	19-May-09	16-Jun-09	22-Jun-09	13-Jul-09
Aluminium	mg/L	0.15	*	*	*	*	*	*	5.42	*	*	10.2	*	6.3
Cadmium	mg/L	0.0008	*	*	*	*	*	*	*	*	*	0.002	*	*
Manganese	mg/L	3.6	*	*	*	*	*	*	*	*	*	7.76	*	5.06
Copper	mg/L	0.0025	100	150	90	110	2.27	100	19.2	320	180	75.7	410	48.8
Nickel	mg/L	0.017	*	*	*	*	*	*	0.259	*	*	1.22	*	0.721
Zinc	mg/L	0.031	*	*	*	*	*	*	0.441	*	*	1.53	*	0.994

Site 7	Unit	Limit	25-Mar-09	16-Jun-09
Copper	mg/L	0.0025	1.03	0.197
Nickel	mg/L	0.017	*	5.29

Site 8	Unit	Limit	25-Mar-09	May-09
Copper	mg/L	0.0025	0.003	699

Redbank Mine Surface Water Sampling Dashboard as of July 2009

Site 9	Unit	Limit	25-Mar-09	May-09	16-Jun-09
Copper	mg/L	0.0025	2.66	709	0.921
Nickel	mg/L	0.017	0.037	*	0.0241
Zinc	ma/L	0.031	0.076	*	*

Site 10	Unit	Limit	16-Jun-09
Copper	mg/L	0.0025	0.0867

Site 11	Unit	Limit	May-09	16-Jun-09	16/06/2009 (DUP)
Copper	mg/l	0.0025	77.2	0.0325	0.0332

Site 13	Unit	Limit	25-Mar-09	16-Jun-09
Aluminium	mg/L	0.15	*	0.253
Copper	mg/L	0.0025	0.068	0.0163

Site 16	Unit	Limit	31/12/2008	21/01/2009	22/02/2009	Feb-09	Mar-09	25-Mar-09	21-Apr-09
Copper	mg/L	0.0025	250	470	98.4	2.27	100	19.2	320

[illegible]

Site 18	Unit	Limit	22/11/2008	31/12/2008	21/01/2009	22/02/2009	Feb-09
Copper	mg/L	0.0025	110	170	110	110	0.0262

Site 19	Unit	Limit	22/11/2008	31/12/2008	21/01/2009	22/02/2009	Feb-09
Copper	mg/L	0.0025	150	180	120	130	7.25

Site 20	Unit	Limit	22/11/2008	31/12/2008	21/01/2009	22/02/2009	Feb-09	24-Mar-09	21-Apr-09	19-May-09	22-Jun-09	16-Jun-09	13-Jul-09
Copper	mg/L	0.0025	1260	760	780	790	680	910	900	820	1160	948	993
Aluminium	mg/L	0.15	*	*	*	*	*	*	*	*	*	455	469
Manganese	mg/L	3.6	*	*	*	*	*	*	*	*	*	51.7	43.5
Nickel	mg/L	0.017	*	*	*	*	*	*	*	*	*	10.4	7.46
Zinc	mg/L	0.031	*	*	*	*	*	*	*	*	*	14.4	11.8
Cadmium	ma/L	0.0008	*	*	*	*	*	*	*	*	*	0.02	0.0053

Redbank Mine Surface Water Sampling Dashboard as of July 2009

Site 21	Unit	Limit	22/11/2008	31/12/2008	21/01/2009	22/02/2009	Feb-09
Copper	mg/L	0.0025	150	130	120	100	0.787

Site 22	Unit	Limit	22/11/2008	31/12/2008	21/01/2009	22/02/2009	Feb-09	24-Mar-09	21-Apr-09
Copper	mg/L	0.0025	890	590	670	760	531	780	1120

[illegible][illegible]

APPENDIX G
EcOz Environmental Services
Groundwater Procedures

Ground Water Sample Procedure



Objectives	To ensure that the sampling method utilised provides groundwater samples that are representative of the actual composition, both spatial and temporal.
Quality Hazards	• Contamination - To minimise sample contamination: • Ensure sample bottles have been obtained from NATA Accredited laboratory. • Ensure equipment is cleaned thoroughly after each sample site with demineralised water. • Minimise cross contamination by collecting samples from the lowest to highest concentrations where possible. • Ensure samples are tightly sealed, stored upright and are cooled using ice bricks and bags of ice. • Field instrument calibration – Probes must be calibrated before each run. • Duplicates – A duplicate sample must be collected on each groundwater sampling run. • Blanks – A blank sample must be collected on each groundwater sampling run.
PPE Requirements:	 Long sleeved shirts and trousers are required to be worn on the site.
References	AS/NZS 5667.11:1998 Water Quality – Sampling. Part 11. Guidance on sampling of groundwater NEPC Schedule B (1) Guideline on the Investigation Levels for Soil and Groundwater

Notes:

Smoking in the field is not permitted.

Keep hands away from the opening of the sampling bottle during sampling to prevent contaminating the sample

Put the lid on the sample and shake immediately after the collection. Place water samples in cooler with ice to maintain a cool environment.

Samples have to be at TNT Freight couriers the same day as sampling, no later than 4pm to be freighted to the lab.

Do not touch the open bottle. Keep bottles clean to prevent contamination

Do not allow bottle lids to touch ground. Keep lids clean to prevent contamination.

Do not allow water to overfill the bottle, particularly not for sample bottles with preservative.

Procedure

Step	Action	Comment
1.	Bore Preparation Groundwater bores require purging of three casing volumes of water prior to sampling in order to obtain an accurate sample of the surrounding aquifer (Phase 1).	
2.	Equipment • Powder-free gloves • Appropriate bottles for sampling • Demineralised water to clean equipment • Esky • Ice bricks • Standing water level whistle • Measuring tape • Pen/ paper for recording • Small jug • Syringe and filters • 20L plastic bucket • Temperature, electrical conductivity and pH meter • Pump • 12volt battery • Small hand tools to open bore cap	
3.	Sampling Procedure at Bore Phase 1: • Wear powder-free gloves • Open bore cap • Lower whistle, when the whistle is heard, mark on rope and pull up • Measure the rope from mark to far end of the whistle • Record standing water level • Calculate volume of water in the bore • Attached pump to battery • Purge out three casing volumes of water • Measure by running the water into the 20L bucket NOTE: If the recharge rate is slow it may take a few days to purge the bore. Once the three casing volumes have been purged, return the next day to sample the bore. Phase 2: • Make sure all bottles are labelled correctly, chain of custody forms are filled out and freight documents are ready to go. • Make sure all ph, temperature and electrical conductivity meters have been calibrated, have spare batteries and are working • Make sure that the ice bricks are solid and in the esky	

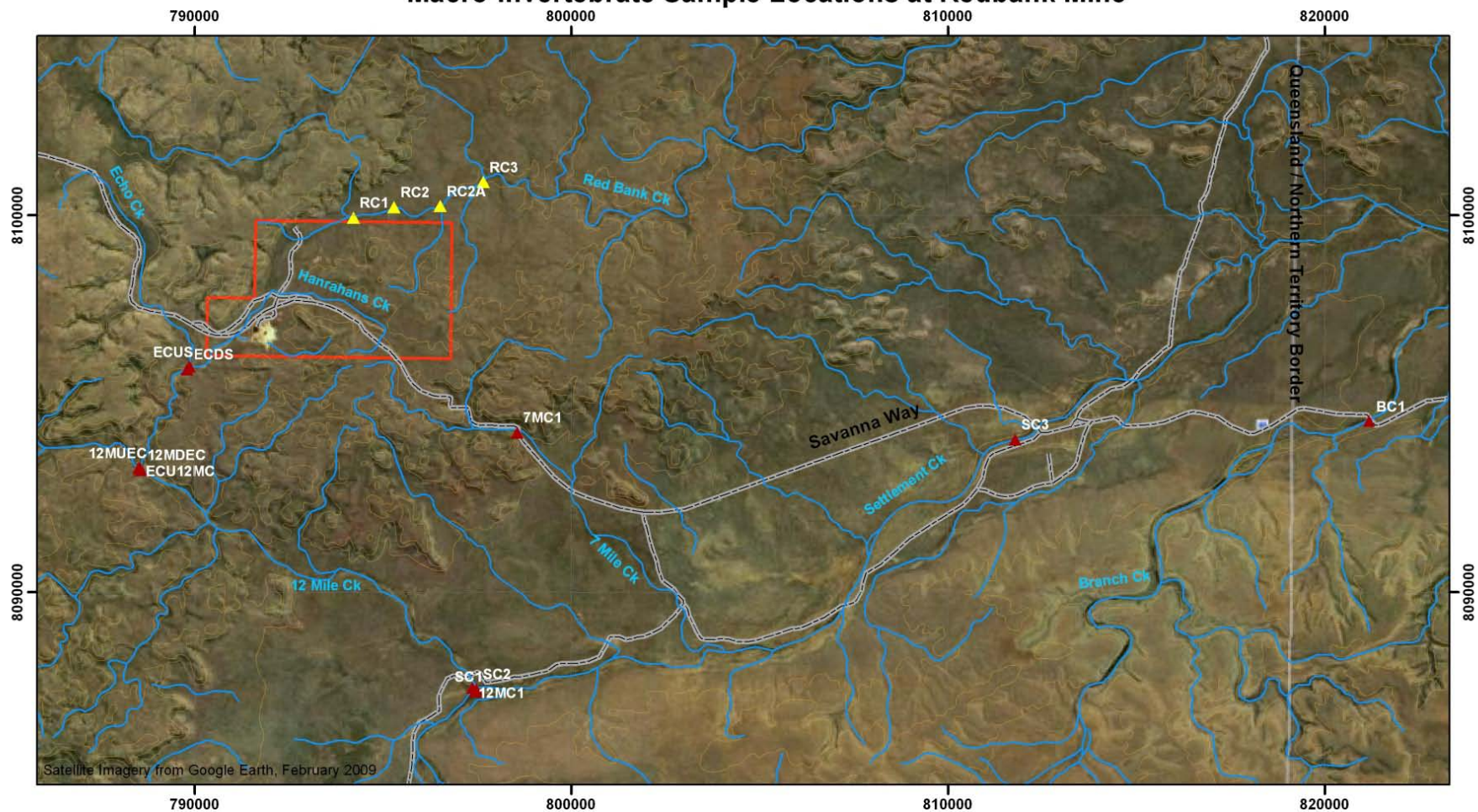
Step	Action	Comment
	- Wear powder free gloves - Open bore cap - Place all bottles on the esky lid with their caps on - Place small jug on the esky lid - Attach pump to battery - Let run til the pump hose has been flushed with bore water - Take the first bottle, unscrew lid and fill to the top trying to reduce the number of air bubbles. Be careful not to over fill the bottles as some contain preservatives. (NOTE: For Heavy Metals See Phase 4) - Re-screw the lid back onto the bottle and place the bottle in the esky. - Be sure not to touch to lip of the lids with fingers - Fill the remaining bottles and place in esky - Fill the small jug - Take out the pH, temperature and electrical conductivity meters - Record the results Phase 3: - Rinse all meter probes, small jug and other equipment with decon and demineralised water solution - Half fill 20L bucket with demineralised water - Place pump into bucket to flush and clean pump and hose - Disconnect pump and roll up hose - Close bore cap Phase 4: - Unscrew lid of heavy metals bottle - Make sure the 'field filtered' box is checked on the label - Fill the small jug - Use the syringe to uptake the water - Attached filter and squeeze into bottle - Repeat this process until the bottle is full or the filter is blocked - If the filter gets blocked repeat the process with a new filter - Screw lid back on the bottle and place in the esky	
4.	TPH, PAH and BTEX These samples are required to be obtained from the surface of the aquifer. These are obtained using a Teflon bailer prior to pumping the bore for sampling of metals. Bottles are to be filled to the brim of the neck of the bottle with an attempt to leave no air spaces in the sample.	<i>Bottle selection:</i> TPH (C6-C9) and PAH – 1L solvent washed amber glass bottle with Teflon lined cap. TPH (C10-C36) and BTEX – 2 x 40 ml hydrochloric acid preserved glass vials. Ensure sample date, time, person sampling and bore number are clearly marked on the bottle label.

Step	Action	Comment
5.	Nutrients These samples are obtained by dropping a pump to the middle section of the slats that are established in the bore. Bottles are to be filled to the brim of the neck of the bottle with an attempt to leave no air spaces in the sample.	<i>Bottle selection:</i> 1L unpreserved plastic bottle with plastic cap. Ensure sample date, time, person sampling and bore number are clearly marked on the bottle label.
6.	Total Heavy Metals These samples are obtained by dropping a pump to the middle section of the slats that are established in the bore. Samples are obtained after at least one minutes pumping time to ensure that the volume of the pump system has passed at least three times. Bottles are to be filled to the brim of the neck of the bottle with an attempt to leave no air spaces in the sample.	<i>Bottle selection:</i> 250 ml nitric acid preserved clear plastic bottle. <i>NOTE: For dissolved metals field filtration is required.</i> Ensure sample date, time, person sampling and bore number are clearly marked on the bottle label.
7.	Cleaning of Equipment Between each sampling site, equipment is required to be cleaned with demineralised water.	
8.	Bottle Transportation Bottles are to be stored to ensure they stay upright in eskies during transport. Bottles are to be packed with ice and ice bricks to ensure they remain chilled whilst on route to the laboratory.	

APPENDIX H

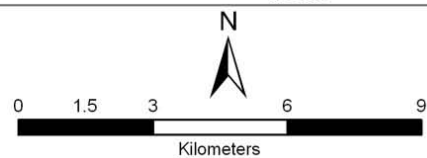
Macroinvertebrate Sample Sites

Macro-invertebrate Sample Locations at Redbank Mine



Legend

- Watercourse lines
- RBM lease Boundary (estimate)
- ▲ Macro-invert Sample Locations 2008
- ▲ Macro-invert Sample Locations 2008 & 2009
- Contours
- Roads



MAP PROJECTION: GDA94 (UTM), Zone 53



VDM
CONSULTING
EcOz

24th, February 2009

APPENDIX I

Previous Waste Discharge Licence

WASTE DISCHARGE LICENCE

(Pursuant to Section 74 of the Water Act)

Licence No. WDL 98
Expiry Date 30/09/2006

Subject to the provisions of the Water Act, Regulations and the following terms and conditions, a Waste Discharge Licence is granted to:

**Alameda Pty Ltd
PO Box 449
Kalgoorlie WA 6433**

to discharge wastewaters from MLN1108 into the receiving waters of Hanrahan's Creek.

Terms and Conditions

1. The Licensee shall, within 14 days of any change of ownership or occupation of the lands in respect of which the licence is granted, or any business conducted thereto, give notice in writing to the Controller of Water Resources, GPO Box 1680, Darwin NT 0801.

2. It is the intent of this licence to require the licensee to:

- a) characterise the wastewater that may be released off-site;
- b) estimate the volume and quality of wastewater entering the receiving waters;
- c) conduct strategic biological monitoring to assess the spatial and temporal extent of detriment; and
- d) to provide an interpretive report on the monitoring program including future water management plans.

3. The Licensee shall conduct the following monitoring and analysis of discharge waters and waters in Hanrahan, Echo, Twelve Mile and Settlement Creeks and shall provide the Controller of Water Resources with such data or information at the following intervals and at such other times as may be directed by the Controller of Water Resources -

- (i) Monitoring sites

Biological Monitoring Sites

A diatom survey under the professional scrutiny (or peer review) of a suitably qualified organisation or person of receiving waters and other waterways in the general vicinity of the Redbank mine shall be undertaken to determine the spatial distribution of diatom assemblages within the Settlement Creek system. An aquatic macro-invertebrate study utilising AUSRIVAS procedural protocols should be conducted contemporaneously with the diatom survey.

An assessment of the creek ecosystem health should be conducted in the early part of the dry season (early May). The site locations shall be recorded by GPS and the co-ordinates included in the report (see Clause 4) submitted to the Controller of Water Resources. The monitoring program should include sites upstream and downstream of any minesite discharges that are entering the Settlement Creek system.

Water Quality Monitoring Sites

- (a) Minesite Pit (water characterisation at the beginning of the wet season)
- (b) Sites where discharges from the pit and drainage channels enter receiving waters.
- (c) Sites included in the biological surveys.

GPS coordinates shall be provided for all monitoring sites in the interpretive report.

- (ii) Hydrological information:

- (a) Rainfall at on-site recorder.

- (b) Pit gauge board level records.
- (c) An estimate of the amount of pit water discharged to the receiving waters in kL/day.
- (d) Date, time and duration of discharges; and
- (e) A qualitative estimate of flow rates in the receiving waters.

- (iii) Water quality parameters:
 - pH (field measurement in pH units)
 - Electrical Conductance ($\mu\text{S}/\text{cm}$)
 - Temperature (*in situ* $^{\circ}\text{C}$)
 - Lead (Total in $\mu\text{g}/\text{L}$)
 - Zinc (Total in $\mu\text{g}/\text{L}$)
 - Copper (Total in $\mu\text{g}/\text{L}$)
 - Cadmium (Total in $\mu\text{g}/\text{L}$)

The methods of sampling and analysis for the above parameters shall be specified in result reports and all laboratory analysis other than *in situ* pH, EC_{25} and temperature measures shall be undertaken by a NATA or similarly accredited testing laboratory. Every effort should be made to obtain representative samples for analysis. Field notes should be made, at the time of sampling, to record prevailing and antecedent weather and other relevant conditions or constraints encountered at the monitoring site. These notes should be used and/or be available for interpretation of the report specified at Clause 4.

- (iv) Frequency of monitoring:

- (a) The biological surveys should be conducted early in the dry season during recession flows.
- (b) An ICP-MS metal scan should be conducted on the pit water prior to the commencement of the wet season to characterise the waste that is discharged.
- (c) Samples should be collected at points of discharge from the site and at such times to allow for an estimate of total contaminant transport from the site to receiving waters.
- (d) Further metal analysis to be conducted in conjunction with the diatom/aquatic macroinvertebrate study.

4. The Licensee will furnish an interpretive report for each wet season period no later than 30 September of 2005 and 2006. The report shall contain details of:

- any construction or modifications to plant, site management regime or process that has or is deemed to potentially have impact on wastewater discharge volumes and/or quality;
- summary information on monitoring of the receiving water environment;
- interpretive report of the diatom survey and macroinvertebrate study; and
- site remediation activities and their effectiveness.

5. The Licensee shall cause any reasonable directions given by the Controller of Water Resources or a properly authorised officer in writing and with reasonable justification and notice of intention, to be implemented.



Controller of Water Resources

719104.