Appendix G
Updated Commitments Table

Redbank Copper Ltd Further Commitments identified in the EIS Supplement.

Subject	Description	Commitment/Safeguard	Section in Supplement
General Information	Oxide Mining	Redbank will be processing oxides only.	**2**
Proposed Development	Rehabilitation	Redbank are committed to a progressive rehabilitation plan	**3**
		remaining rehabilitation requirements will be completed soon after processing operations begin	**3**
		rehabilitation monitoring will continue past closure of operations and identified remediation requirements will also be addressed past this point	**3**
		The rehabilitation plan will be fully developed utilising a current best practice adaptive management strategy to ensure that the best options are chosen when available	**3**
	Legacy Issues	Redbank are committed to ensuring that the mistakes of the past are not repeated.	**3**
Alternatives	Environmental Monitoring Bores	All new EMB additions will be added to the sampling program and will aid in developing an understanding of contamination both spatially and temporally	**4**
	Water Management	Current water treatment practices will be studied to assist in understanding water contamination issues.	**4**
		The results of the following areas of investigation planned for 2010 will help direct a decision as to whether a pit can be sterilised and utilised for storage of potential contaminates: 1. A drilling program that will identify the potential to sterilise a pit; and 2. Testing the ARD potential of the sulphide materials and their relevant volumes	**4**
		The ongoing and post closure monitoring of surface and groundwater will continue for at least 5 years or until DRDPIFR are satisfied that the site is meeting its closure criteria.	**4**
Preliminary Risk Assessment	Legacy Environmental Issues	Redbank will continue to invest into remediating the legacy issues over which they have responsibility, and management to ensure they minimise risk of further environmental impact.	**5**
	Rehabilitation	Decommissioning and rehabilitation strategy will be in place within the first year of operation.	**5**
	Threatened Species	Camp design and ongoing management will continue to be aware of the need to minimise potential impacts on the Carpentarian Rock-rat	**5**
	Closure Plan	Development of the closure plan will begin in 2010 and be ongoing throughout the project as research continues and rehabilitation trials are monitored.	**5**

Subject	Description	Commitment/Safeguard	Section in Supplement
Preliminary Risk Assessment	Potential Water Contamination	Waste and ore storage areas will be monitored for potential contaminants that may emanate from the area and enter the surface or ground waters.	**5**
	Risk Assessment	The risk assessment was also identified as 'preliminary', and will thus be reviewed throughout the life of the project	**5**
		The first review of the Risk Assessment will focus on stakeholder comments received on the draft EIS.	**5**
	Future Development	All new activities will be aligned with current best practice and environmental management will be rigorous, monitored and ongoing.	**5**
		The management of newly proposed activities will be separate from legacy issues	**5**
	Environmental management	EcOz staff will be contracted for the management and monitoring tasks for which they have appropriate expertise.	**5**
	Environmental Auditing	Environmental performance will be independently monitored through DRDPIFR's audit process	**5**
	Legacy Issues	Redbank will continue to invest into remediating the legacy issues over which they have responsibility, and management to ensure they minimise risk of further environmental impact.	**5**
	Operational Design	All parties involved in the previous venture learnt valuable lessons and will thus ensure that, should the current venture experience severe commodity price down turn, greater security bonds and improved infrastructure design will affect a far more acceptable and sustainable situation than what currently exists.	**5**
	Risk Assessment	Future planned activities will include greater details on the risk assessment process for a variety of options	**5**
Pre-existing Environment	Environmental Management	Lessons learnt from investigating the legacy issues at the Sandy Flat Area will be applied to ensure that the environmental risk to Redbank Creek system is minimised	**6.1**
	Water management	The annually updated WMP will identify the water monitoring regime	**6.1**
		A more detailed ground water monitoring and research program is also underway and both will be expanded during 2010	**6.1**
		Site specific surface water sampling locations will be established with each new facility	**6.1**
		EMB's will be established to obtain baseline ground water quality information and allow for ongoing monitoring around new facilities	**6.1**
		New surface and groundwater sampling locations will be required to be approved through the WMP process	**6.1**
	Remedial Actions	Remedial actions for issues identified by monitoring will be determined in consultation with DRDPIFR and other relevant Government Departments according to the relevant activity.	**6.1**

Subject	Description	Commitment/Safeguard	Section in Supplement
Pre-existing Environment		Proposed remediation methods include re-processing legacy wastes until they no longer pose a contamination risk, surface water management through bunding and diversion banks, and neutralising PAF materials and waters with lime	**6.1**
	Environmental Legacy Issues	Redbank are committed to addressing the onsite environmental legacy issues which will result in a reduction of contamination exiting the site	**6.1**
		Samples of the existing stream bed soil conditions have been analysed and will be repeated after this and subsequent wet seasons	**6.1**
	Remedial Actions	Should low pH water seep from the SF Pit or any other source, the current monitoring regime will identify it early so that its source can be identified and remediation actions put in place	**6.1**
	Water Management	It is expected that the water levels in the SFP will be reduced to a point that it will be impossible for those waters to express into the surface waters via the ground water.	**6.1**
		Improved management of the site associated with new operations will result in a reduced area of catchment that directs contaminated water into a storage structure (currently the SFP pit).	**6.1**
		Testing and studies will take place prior to the potential for mining Sulphidic Ores to assist in determining the extent of groundwater contamination.	**6.1**
	Water Management	A comprehensive monitoring regime has been designed to enable early detection of contaminating issues, should they occur, and monitoring points will be located to provide a reasonable estimate of contaminant origin	**6.1**
		Redbank will invest all available resources into remediating any water contamination issues until monitoring indicates that the problem has been resolved.	**6.1**
		2010 will also see the installation of new monitoring points so as to ensure awareness of any potential new impacts so that they may be acted upon immediately	**6.1**
		A solid baseline of conditions in Hanrahans Creek and downstream environments exists so that environmental improvements can be tracked and a thorough baseline of the un-impacted Redbank Creek exists and will be built on this year prior to any mining activities.	**6.1**
		New EMB's will be installed in early 2010	**6.1**
		The reduction of the Sandy Flat Pit water to topographically below the level at which it can express into the surface water systems **will** result in an immediate substantially positive impact on the surrounding environment by way of not allowing another year of extremely acidic and metal laden water to enter the environment.	**6.1**

Subject	Description	Commitment/Safeguard	Section in Supplement
Protection of Flora and Fauna	Reduced Risk to Fauna	Redbank will consider the following options to reduce the number of native animals drinking from contaminated mine water sources (such as sulphide pits and TSF): • Screening or netting liquid tailings or avoiding supernatant; • Use of live and 'bird frite' ammunition if flocks of 'susceptible species' are present, or significant mortalities are being experienced; • Keeping surrounding ground bare of vegetation and debris; Checking for, and removing, carrion daily to avoid attracting raptors and native scavengers	**6.2**
	Weed Management	Redbank will undertake weed mapping at a finer scale	**6.2**
		All weed mapping and weed management data will be sent to NRETAS Weed Management Branch for amalgamation into the Territory data set.	**6.2**
		Redbank will build a wash down area so that all vehicles and equipment arriving and leaving the site can be inspected *prior to entering and leaving* and, if necessary, washed to reduce the risk of weed spread.	**6.2**
	Impacts on Flora and Fauna	Ongoing monitoring will be undertaken to assess the impacts of mining works and expansions on local flora and fauna	**6.2**
	Threatened Species	Carpentarian Rock-rat and Gouldian Finch monitoring will be conducted on an annual basis.	**6.2**
	Ecological Research	Redbank will engage in (either actively or by providing support for) further ecological research in the region	**6.2**
	Threatened Species	Redbank and EcOz will seek advice from the NT Biodiversity Division on Rock-rat and Gouldian Finch survey methodologies and align with their preferred monitoring outcomes.	**6.2**
	Introduced Species	Redbank have committed to pest animal management actions as detailed in the following paragraphs, and the Draft EMP will be updated accordingly.	**6.2**
		A feral cat trapping program will be initiated in 2010.	**6.2**
		Through preventative measures, Redbank will minimise introduction of new weed and pest animal species. If new species are detected, management plans will be put in place to eradicate. Existing weeds and pest animals will be monitored and managed in conjunction with the land owner and government authorities to minimise population increase and spread. The draft project EMP reflects this change and will be submitted for approvals in the near future.	**6.2**
		Any signs of feral pigs and notes on the extensiveness of habitat damage will be recorded	**6.2**
		Redbank will continue to work with Wollogorang Station to provide feral animal control on the mining lease.	**6.2**

Subject	Description	Commitment/Safeguard	Section in Supplement
		The use of firearms will necessarily comply with the conditions of the mining lease.	**6.2**
	Habitat Protection	Redbank will not be clearing or directly impacting the riparian systems, comprehensive monitoring of ground and surface water quality as proposed in the draft EIS will allow early detection and thus mitigation of potential deteriorating water quality within the downstream river systems.	**6.2**
		Redbank will not clear any monsoon forest habitat, and will not clear within 300 metres of monsoon forest habitat.	**6.2**
		Management strategies to protect threatened species through protection of significant habitats such as monsoon forests from fires will be developed.	**6.2**
		Fencing for the exclusion of cattle will be considered for Masterton's Gully should further research and monitoring highlight the need, however the cattle are the property of Wollogorang Station and any cattle management strategies would need to be approved by the owners.	**6.2**
	Weed Management	Redbank plan to spray the Hyptis around the base of the gully at the end of this wet season, and will monitor the extent of the existing Hyptis infestation annually	**6.2**
		Should the Hyptis infestation prove to be spreading throughout the Gully, management actions will be implemented, and will involve foliar spraying the plants with herbicide, with annual follow-up spraying as required. Redbank will monitor the site quarterly following the spraying to ensure that the Hyptis is not replaced with new invasive species or native grass species that may increase risk of wildfire.	**6.2**
	Introduced Species	Redbank will ban cats and dogs from entering the lease for the life of the mine, and staff and contractor inductions will emphasise this ban.	**6.2**
		Redbank will maintain a feral cat trap at the base of the gully.	**6.2**
		Any cats trapped will be euthanased in accordance with Animal Ethics requirements	**6.2**
	Threatened Species	Redbank will support any external studies that are to be conducted within the project area, and, under the guidance of the NT Biodiversity Division, will conduct annual monitoring of Rock-rats within Masterton's Gully..	**6.2**
		Redbank will support any external studies that are to be conducted within the project area, and may implement surveys to gather requested data from authorities	**6.2**
		Redbank will support local Carpentarian Rock-rat research that will provide biological information for input into the PVA models.	**6.2**
	Fire Management	Redbank will maintain sufficient resources on hand to extinguish a wildfire should it start through activities on ERL94	**6.2**

Subject	Description	Commitment/Safeguard	Section in Supplement
	Threatened Species	A suitably qualified ecologist will check for hollows in trees designated prior to clearing	**6.2**
		Ongoing monitoring will identify any populations in residence for an extended period in order to ensure that breeding Gouldian Finches are not disturbed.	**6.2**
	Fire Management	Redbank's proposed fire management strategy will stand as outlined in the draft EMP	**6.2**
		Redbank will encourage liaison with Bushfires NT for fire management advice, and engagement of local traditional owners to conduct the burns. In addition, Redbank will minimise the risk of wildfires originating through their own mining activities, and will maintain resources on site to extinguish a fire should it start.	**6.2**
Protection of Water Resources	Water Management	Redbank will maintain the (lowered) water level of the SFP in order to remove the potential for contaminated water to enter the natural system during the wet season, resulting in improved off site and downstream water quality	**6.3**
		WRD's will be designed to eliminate or at worst minimise release of acidic water to the environment.	**6.3**
		A detailed monitoring program will be established to monitor potential water quality impacts.	**6.3**
	Monitoring	Fish monitoring will take place annually to detect improvements. The involvement of Traditional Owners will be sought for this survey.	**6.3**
		Monitoring will continue until water quality targets are met.	**6.3**
	Water Treatment	Any site expansions will take into account the location of water sources and actions will be taken where necessary in order to conform with the NT Code of Practice for Small On-site Sewage and Sullage Treatment Systems and the Disposal or Reuse of Sewage Effluent (The Code).	**6.3**
	Water Sources	Camp water will be supplied from the nearby bore	**6.3**
	New Environmental Monitoring Bores	Redbank Mines will locate monitoring bores between the dewatering system and the springs to demonstrate that dewatering will not impact on the springs. Should the springs (negligible probability) be impacted upon by the dewatering activities, management options include; • Placing a recharge bore between the dewatering bores and the springs; • Supplementing flow in the springs with a similar quality of water from bores located somewhat closer to the springs; • Piping water of a similar quality from the dewatering system to the springs; and/or • Sourcing alternative camp water supplies other than the bore at the camp in order to avoid risk of overdraft.	**6.3**
	Water Management	The small drainage necessarily crossed by the proposed WRD will be diverted and managed as its upper catchment will be impacted by the proposed pit.	**6.3**

Subject	Description	Commitment/Safeguard	Section in Supplement
	Monitoring	Groundwater sampling will be performed on a monthly basis for the first 12 months of EMB installation and updated results will be incorporated in forthcoming annual WMP updates.	**6.3**
		Once ground and surface water monitoring indicates trigger levels have been exceeded over consecutive days, further monitoring and remedial actions will be put into place	**6.3**
		An update on the macroinvertebrate sampling results will be supplied to the relevant authorities as soon as this information is received.	**6.3**
	Sedimentation	The sediment dam for the oxide WRD will be designed to hold 500m³ of sediment for every hectare of catchment	**6.3**
	Design	The RWD will be designed during 2011.	**6.3**
	Water management	New surface water management infrastructure will be established at the SFP processing plant area to ensure that all potentially contaminated storm water is captured and stored on site	**6.3**
		The addition of infrastructure to prevent clean waters entering contaminated areas will be planned on site as developments occur.	**6.3**
	Water Management	Surface water management structures will be installed around new pits and WRD's to direct any surface flows of clean water away from the area of impact and into the natural drainages.	**6.3**
		Settlement ponds will be monitored and if required, treatment measures will be designed in accordance with anticipated water flows and qualities.	**6.3**
	New Environmental Monitoring Bores	The installation of monitoring wells and associated studies will be conducted in the early dry season.	**6.3**
	Water Management	The observation re the insignificance of seepage from the SF Pit will be continuously reviewed and particularly during further drilling, testing and sampling programs and subsequent modelling	**6.3**
		Dewatering effluent will be treated in the plant to a pH of at least 7.0 in accordance with the Waste Discharge Licence prior to release, if required	**6.3**
		Redbank Mines will locate monitoring bores between the dewatering system and the springs to demonstrate that dewatering will not impact on the springs.	**6.3**
		Ongoing monitoring of the springs will include water quality and flow rate.	**6.3**
Decommissioning and Rehabilitation	Management Plan	Decommissioning Plan will be developed over the following years in preparation for the end of operations	**6.4**
	Pit Rehabilitation	Redbank have committed to investigating and attempting to determine if any of these deposits can be	**6.4**

Subject	Description	Commitment/Safeguard	Section in Supplement
		defined as ceasing at depth so that the possibility of infilling, or sterilizing a pit can be progressed. This work will begin during 2010.	
		The proposed Redbank Pit will be designed to have nil catchment other than direct input to its own surface area	**6.4**
		Pit closure strategies will be developed to ensure zero discharge of pit void water into the environment and therefore there will not be any requirement for ongoing management	**6.4**
Social Environment	Complaints Management	Redbank will advertise (phone book and website) an enquiries phone number and email address such that community members who wish to complain or enquire about dust and noise may do so.	**6.5**
		Administration personnel will be allocated time to record and appropriately respond to any complaints received.	**6.5**
	Kitchen and Food Handling	All mine site kitchens will hold *Food Act* registration, and will be consistent with standards contained in Australian and New Zealand Food Standards Code.	**6.5**
	Health Management	All expansions and operations will also be performed in accordance with the Environmental Health Information Bulletin No 6 - Requirements for Mining, Construction & Bush camps.	**6.5**
Waste and Hazardous Materials Management	Waste Water Treatment	When camp expansion is required in the future, a consultant will be engaged to assess the adequacy of the existing waste water treatment facilities and make recommendations on further facilities required to accommodate additional personnel.	**6.7**
	Waste Disposal Site and Landfill	The landfill site will be constructed in accordance with the *Building Act* (NT) , *Waste Management and Pollution Control Act* (NT), Waste Management and Pollution Regulations (NT) and Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory (EPA 2003).	**6.7**
		DHF will be notified of plans to upgrade the existing waste disposal site prior to construction.	**6.7**
	Storage Facilities	The hazardous substance and dangerous goods storage facilities will be incorporated into the design of the plant and processing facility located at the Sandy Flat processing site	**6.7**
Historical and Cultural Environment	Consultation with Traditional Owners	Redbank will build upon its commitment to engaging and communicating with traditional owners by identifying priorities for discerning and documenting a cultural baseline and how this may be achieved	**6.8**
		Redbank will make the commitment to consult further with traditional owners to ascertain some of the key values of these tributaries, with a particular focus on species and qualities (or uses) which may be useful indicators for detecting negative impacts or restoration of the degraded systems against the undisturbed Redbank Creek.	**6.8**
Air, Noise and	Greenhouse Gas	Greenhouse gas emissions from the proposed expanded mine will be reported annually for the life of the	**6.10**

Subject	Description	Commitment/Safeguard	Section in Supplement
Greenhouse Gas	Emissions	mine in a transparent manner in accordance with the Territory Greenhouse Gas Inventory	
	Carbon	Redbank Mine will rehabilitate this pit area once available copper ores have been extracted, resulting in an anticipated net gain in carbon stocks at this location	**6.10**
		Redbank will engage an ecologist to gather ancillary data necessary to calculate carbon stocks to a greater accuracy, including from a representative 50m x 50m plot in each identified vegetation type: • average trunk diameters at breast height and range; • average tree height and range; • tree densities within plot; • general woody growth descriptions; and • collected cross-sections of tree trunks of dominant upper-storey species (allow wood density and age estimates from which growth rates may be estimated for each species).	**6.10**
		Total area cleared of each vegetation type will also be recorded.	**6.10**
	Draft ESCP	The draft ESCP will be finalised soon after the submission of this Supplement and submitted to NRETAS for approval prior to implementation	**9**

Redbank Copper Ltd Commitment Table from EIS

Subject	Description	Commitment/Safeguard	Section in EIS
Safety and Risk Management	Continual Improvement	A continual improvement approach will be taken for risk management, and annual updates to the Mining Management Plan (MMP), Water Management Plan (WMP) and the Waste Discharge Licence (WDL) will reflect the latest developments in research and monitoring.	5.1.2
	Potential Acid Forming material	Research and monitoring into the potential impacts of Potential Acid Forming (PAF) material at Redbank has begun and will be ongoing throughout the life of the project.	5.1.4
Economic Contribution	Employment Opportunities	Appropriate skills-transfer and employment opportunities will be provided throughout the region through the encouragement of local business enterprises, giving preference to a local supply chain, and requiring contractors to provide the same.	3.1.1, 6.5.3
	Local sourcing of goods and services	Goods and services will be sourced from the Northern Territory where possible.	3.1.1, 6.5.3
Exploration Drilling	Minimal impact	Any diamond drilling will use portable aboveground tanks for water circulation, alleviating the requirement for sumps to be excavated in ground.	3.15
	RC Bags	RC bags will be removed from the drill site by the end of the current field season.	3.15
Remediation of Pre-existing Environment	Investigation	Investigations will continue at least through the first 2 years of operation to enable understanding and effective management of the contamination associated with environmental legacy issues.	6.1.5, 6.5.2
		Shallow electromagnetic geophysical exploration will be used to ‘trace’ contaminant migration zones and provide suitable drilling targets for a detailed aquifer assessment.	6.3
		The contaminated water, ore piles and waste rock at the Sandy Flat site will be investigated so as to determine whether they should be treated, processed, moved to contained areas, moved to the TSF, or remediated.	6.1.5
		Flow and mass transport modelling of the SFP and Hanrahan’s Creek impacted zone will be conducted.	6.3
	Surface water management	New surface water management infrastructure in the form of surface water flow management devices and retention ponds will be installed.	6.1.5

Subject	Description	Commitment/Safeguard	Section in EIS
Remediation of Pre-existing Environment (continued)		All potentially contaminated surface water will be collected and directed to a suitable storage facility or the pit or TSF where it can be stored for treatment or utilisation.	6.1.5
	Pit water treatment	The water from Sandy Flat Pit will be treated with limestone and lime so as to increase its pH close to neutral and precipitate the dissolved metals (especially copper and aluminium) so that water can be released according to the water quality standards agreed to in the current Waste Discharge Licence conditions.	6.1.5, 6.7.1
	Ground water study	A detailed study into the ground water systems and resources, including ground water monitoring of existing and new bores, will be conducted to determine the nature and extent of local aquifers.	6.1.5
	Ground water study	Redbank will undertake further drilling including shallow (less than 10m) and deep (up to 50m and cutting off the shallow weathered/fractured strata) bores in the area between SFP and Hanrahan's Creek.	6.3
	Surface water monitoring	A comprehensive surface water monitoring program as identified in the WMP will be conducted at frequent intervals to allow the current extent of contamination to be determined, and allow early detection of improvements to quality within the downstream watercourses.	6.1.5
	Adaptive management	Lessons learnt from studying the existing environmental legacy issues will be fully utilised in all stages of design and planning of future activities so as to establish thresholds of impact and prevent repeating the environmental mistakes that have been inherited.	6.1.5
	Research and management	Redbank will foster improved fire management and active weed control as well as support research endeavours in the region, especially into endangered species.	6.8.3
Protection of Flora and Fauna	Research and management	Redbank are committed to supporting Government surveys in the Redbank region targeting species of conservation significance, especially in regards to the Carpentarian Rock-rat.	6.2.3
	Protection of valuable habitat areas.	Redbank will avoid impacting sandstone monsoon habitat areas and will actively manage weeds and fire that may degrade the quality of the habitat.	6.2.3
	Protection of valuable habitat areas.	Proposed expansion areas will be selected to avoid *Eucalyptus leucophloia* (Snappy Gum) woodland habitat where practicable.	6.2.3

Subject	Description	Commitment/Safeguard	Section in EIS
Protection of Flora and Fauna (continued)	Vegetation clearing	Vegetation clearing will be kept to the minimum necessary to accommodate proposed expansions	6.2.8
	Artificial lighting	Camp lighting will be maintained at low levels, and installed in directional arrangements designed to minimise light spill on surrounding areas.	6.2.3
	Vegetation corridors	Redbank commits to retaining native vegetation corridors between Monsoon Forest patches along the escarpment.	6.2.4
	Fire management	Fire management procedures will be employed to decrease the risk of high intensity, late dry season wildfires.	6.2.4
	Exclusion of fauna species	Redbank will erect fences or similar structures to exclude cattle and horses, along with other vertebrate fauna species, from hazardous areas such as the tailings storage facility.	6.2.3
	Invasive species	Redbank will avoid creating artificial habitats that may provide potential Cane Toad breeding grounds, and are committed to support any invasive species programs operating in the area.	6.2.3
	Invasive species Ground and surface water monitoring	Redbank will actively manage weeds in areas of monsoon vine-forest habitat within the project area.	6.2.3
		Redbank will build a wash down area so that all vehicles and equipment arriving and leaving the site can be inspected and if necessary washed to reduce the risk of weed spread.	6.2.3
		Redbank are committed to continuing their comprehensive groundwater and surface water monitoring regime at quarterly intervals for the first year post mine closure, and bi-annually for the following two years. Any issues that may be identified during this monitoring period will be addressed immediately.	6.5.8, 6.3.3
Protection of Water Resources	Ground and surface water monitoring	Standing water levels will be closely monitored at the camp water bore and stream flow of Muinyin Spring (within Masterton's Gully) and measured as part of monthly monitoring.	6.2.3
		Redbank commit to bore and aquifer testing by means of pumping tests to obtain the hydraulic parameters of the aquifer required for aquifer and contaminant assessments by means of modelling.	6.3
		Geochemical characterization of the ground water regime will be investigated with regard to heavy metals.	6.3

Subject	Description	Commitment/Safeguard	Section in EIS
Protection of Water Resources (continued)		Redbank will continue with current sampling at all sites in accordance with the WMP and WDL.	6.3
		Erosion and sediment control measures will be put in place to control surface water runoff and minimise erosion and deposition of sediment and silt in water courses.	6.3.3
	Influence of the mine on receiving waterways	Creek crossings will be designed and constructed to minimise impacts to banks and creek beds.	6.3.3
		The undertaking of site specific Erosion and Sediment Control Plans (ESCPs) will occur prior to mining development on the ERL. An ESCP will be provided prior to the construction of haul roads, topsoil stockpiles and WRD's, and each ESCP will be in accordance with Northern Territory Government requirements.	6.6.3, 6.5.4
		Monitoring of downstream areas will be conducted on an ongoing basis such that any erosion issues can be quickly diagnosed and rectified in accordance with the Northern Territory Erosion and Sediment Control Guidelines.	6.6.3
		Redbank commit to a net positive effect on the water quality and stream health in Hanrahan's Creek and downstream tributaries of Settlement Creek.	6.3.2
	Contaminated water treatment	Redbank will undertake water treatment processes with contaminated water currently occurring in Sandy Flat Pit. Treatment will involve raising pH and reducing copper and aluminium concentrations	6.2.6
	Wind and earthquakes	All infrastructure, and where possible, all pits, WRDs, and TSFs will be designed to withstand seismic activity and according to wind loading requirements.	6.7.1, 6.6.3
Prevention of Contaminated Discharge	Contaminated water	All potentially contaminated waters will be contained in ponds on site so that they can be tested prior to release.	6.1.5
	Reassessment of release requirements	As improvements in stream health are made, the quality of release waters be reassessed, such that released water is of equal or superior quality to that within the discharge waterway.	6.1.5

Subject	Description	Commitment/Safeguard	Section in EIS
	Surface water runoff	Diversion banks, contour banks, and drains will be designed and located around all impacted areas to ensure that clean surface water runoff is directed away from potentially contaminating substances, and potentially contaminated water is retained and pumped to holding ponds for testing and treatment prior to discharge.	6.7.1
	ROM pad	The ROM pad, that will hold mined ore close to the crusher, will be a bunded zone which is engineered to contain stormwater run-off.	6.7.1
	Stakeholder engagement	Stakeholders will continue to be engaged such that project related information can be shared in a transparent manner both ways, Redbank can receive feedback on a range of concerns, employment outcomes can be achieved, contributions can be made to the regional knowledge base, and natural resource management initiatives can be contributed to where practicable.	6.5.3
Social Impact Management	Stakeholder engagement Payment of royalties	Ongoing consultations with land owners and native title holders will occur regarding retention, removal, or relocation of infrastructure. Infrastructure that is not to retained by land owners and native title holders will be removed and the site subject to rehabilitation.	6.5.8
		Relevant stakeholder input or concerns will be addressed within the annually updated Environmental Management Plan (EMP).	6.8.3
		For any negotiated benefits or royalties associated with the proposed expansions, Redbank will engage with a representative organisation with the capacity to manage this role with sound governance procedures.	6.5.3
	Employment and training	A partnership will be forged with the Northern Land Council's Employment and Training branch to tap into a register of trained locals as well as host onsite training in relevant activities such as mining vehicle operation.	6.5.3
	Indigenous rangers	If there is sufficient interest to develop a skills base, Redbank will engage the services of local Indigenous rangers to assist with environmental management and rehabilitation activities.	6.5.3
Social Impact Management (continued)	Health management	Potential substance abuse by staff will be minimised through not allowing alcohol to be brought on site, allowing only moderate alcohol consumption on site within a wet mess only, and establishing a rigorous drug and alcohol screening procedure.	6.5.3
	Health management Counter Disaster Plan	All employees will comply with a health surveillance program to ensure adequate fitness and medical condition as well as to monitor effects of any potential hazards from the operation of the mine.	6.5.3

Subject	Description	Commitment/Safeguard	Section in EIS
		A Counter Disaster Plan, including available evacuation facilities, will be developed to guide preparation for and response to emergencies during the life of the mine. Redbank will also seek to be included in the Borroloola Counter Disaster Plan to ensure any evacuation needs from Redbank can be accommodated.	6.5.3
	Communications	VOIP telephony and wireless internet communications will be provided for staff for general and emergency use.	6.5.3
	Cyclones	Plant and associated infrastructure constructed according to AS1170.2 for wind loads.	5
	Safeguards for road closure	Staff will be rostered so that there will always be two staff trained in remote first aid delivery on site at all times, and appropriate medical, first aid supplies, and food will be maintained on site for the times of wet season road cuts.	6.5.3
	Airstrip upgrade	Redbank's airstrip will be upgraded in line with CASA standards for daytime charter operation, thus providing access by light aircraft including emergency aero-medical services during daylight hours.	6.5.3
	Waste Rock Dumps (WRDs)	WRDs will be positioned based on ground and surface water movements and waste rock characteristics and volumes. The initial slope requirements will be determined by a number of factors including the safe working angles of machinery and the erosion properties of topsoil used in rehabilitation of the landform. Areas of waste rock that require topsoil will be constructed with surfaces less than 20 degrees with a convex crown sloping into a concave lower slope to reduce the velocity of runoff as the catchment of the slope increases.	6.6.3
Landform and Erosion Control	Waste Rock Dumps (WRDs) Landform Evolution Models	The height of each WRD will be determined by local topography, to a maximum height of 20 metres.	6.7.1
		Areas of waste rock that may require topsoil will be constructed with profiles less than 20 degrees with a convex crown sloping into a concave lower slope to reduce the velocity of runoff as the catchment size increases	6.5.4
		A landform evolution model will be developed for each of the waste rock dumps to minimise the erosion potential of these landforms. Parameters will include; sub-surface acid forming material, landform, surface characteristics, wind, rainfall, rate of sediment transportation, distance and location of sediment deposition, surface and underground drainage patterns, revegetation success, and percent vegetation cover.	6.6.3
	Benches and batters	In cases where area is restricted, benches will be positioned in the landform to control erosion. Minor sections of steeper slope will be protected from erosion with rock batters constructed of inert rock.	6.6.3

Subject	Description	Commitment/Safeguard	Section in EIS
Landform and Erosion Control (continued)	Roadside erosion	Erosion and sediment monitoring will be conducted over established roads in the project area in line with the Erosion and Sediment Control Plan.	6.9.3
	Roadside erosion Sediment dams	The minimum grade for drains along roadsides will be 0.5% to reduce velocity and potential for erosion. Native vegetation will be encouraged in drainage lines to promote stability and entrapment of sediment.	6.6.3
		Impacted drainage lines will be diverted into a sediment dam to trap any transported sediments before releasing water from the landform into an existing suitable watercourse. Sediment dams will be designed to accommodate the large rainfall events that are common in the region and monitored and maintained to ensure they remain effective.	6.6.3, 6.5.4
	Sediment dams Design of open pits	Rock dissipaters will be constructed to reduce the flow velocity at sediment dam discharge points.	6.6.3
		Proposed new open pits will be surveyed and shaped by a mining engineer to ensure a safe stable profile suited to local rock characteristics. Earth diversion banks, and safety bund walls will be constructed to divert water away from the pit and into existing drainage lines.	6.6.3
	Haul road construction	Haul roads within ERL94 will be constructed across slope so as to reduce the erosion potential along the alignment. Roadside windrows will be removed to maintain natural rainfall runoff direction across the road surface, minimising the concentration of flows. Topsoil removed from the alignment will be stockpiled for future placement at onsite WRD's.	6.6.3
	Haul road construction Creek crossings	Design of the Haul Road will accommodate frequent and controlled collection and discharge of runoff from the road in order to prevent soil erosion and trap sediment before it is dissipated into natural drainage areas.	6.6.3
		The haul road has been located so as to avoid steep topography, watercourses, historical sites and areas of cultural, environmental or biodiversity significance.	3.7
		Haul roads are to intersect with creek and drainage lines at a 90 degree angle to minimise erosion potential at the crossing.	6.6.3

Subject	Description	Commitment/Safeguard	Section in EIS
	Tailings Storage Facility (TSF)	The new TSF will utilised a disturbed area. Any new disturbance will avoid primary fauna habitat and major drainage lines, and within the same surface and groundwater catchment as the existing facilities. The new TSF will be designed to avoid overflow.	3.10
Waste and Hazardous Materials Management	Tailings Storage Facility (TSF) Tailings storage	The new TSF will be built from non acid forming waste materials sourced from local borrow materials within the tailings dam area and supplemented by waste rock from open pit overburden removal.	3.11
		The new TSF will be designed according to advice from the sites specialist TFS engineer and metallurgist, who will investigate optimal structural integrity of the wall and the requirement for lining prior to construction and development. Oxide tails materials from the first 2 years of processing may form a gypsum rich lower layer that seals the dam and provides neutralising capacity.	6.6.3
		TSF designs will be undertaken to best practice and will be based on the “Guidelines on Tailings Dam Design, Construction and Operation" of October 1999, by the Australian Committee on Large Dams.	3.10
		The coarse tailings will be relatively dry and will be stored in stable stacks with slopes of 1:3, they will be progressively reclaimed by placing waste and topsoil to seal and cover.	3.10
Waste and Hazardous Materials Management (continued)	Tailings storage Acid consuming rock	The finer sandy tailings will be pumped as slurry and will be stored with their surface at a very low angle that will be effectively horizontal. All tailings storages will be surrounded by low bunded walls that will collect runoff to be returned to the process water stream.	3.10
		Acid consuming dolomitic rock material and imported lime will be used to manage PAF subgrade material extracted from the sulphidic zone.	3.10
	Waste rock monitoring and storage	The ongoing monitoring of waste rock prior to removal will detect any material with the potential to form acid leachates. This material will be stored in either capped waste rock dumps, processed or potentially backfilled into sterilised extraction pits partially filled with water. The primary aim is to reduce PAF material from interacting with air or moisture.	6.6.3
	Rehabilitation of waste rock dumps	Capped waste rock dumps will involve a layer of neutralising dolomitic rock on the PAF waste rock, overtopped by a layer of suitable onsite material compacted to create an impermeable layer. A layer of suitable overburden and top soil will then be placed above the capping to enable the establishment of cover vegetation to assist in the rehabilitation of the site.	6.5, 6.6.3

Subject	Description	Commitment/Safeguard	Section in EIS
	Ore stockpile management	Impermeable storage areas will be created to store sulphide ore stock piles for processing, such that acid runoff can be contained and subsequently utilised in processing or treated for release.	6.6.3
	Waste management	A tip will be constructed on site in accordance with the NT Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites for disposal and burning of most putrescible wastes.	6.7.1
	Waste management Sewage	Any material deemed unsuitable for the local land fill will be stored and managed on site and disposed of by licenced contractors when appropriate.	6.7.1
Waste and Hazardous Materials Management (continued)		The rubbish tip associated with the camp will be progressively managed to ensure it meets all legislative requirements and guidelines, and will be fully rehabilitated at the completion of mining and processing operations.	6.7.1
		Redbank's waste management strategy of “Avoid, Reduce, Reuse, Recycle”, will include appropriate storage and disposal, segregation and recycling of wastes (depending upon the availability and capacity of local facilities), and maintaining all work areas in a neat and orderly manner.	6.7.1
		The putrescibles tip associated with the camp will be progressively managed to ensure it meets all legislative requirements and guidelines, and will be fully rehabilitated at the completion of mining and processing operations.	6.5.8
		All site and camp sewage will be managed on site via septic systems in accordance with relevant health requirements, and will be regularly monitored.	6.7.1
	Process wastes	Process wastes will be sent to the TSF or recycled through the process circuit. Flocculants will be added to tailings where necessary so as to bind the tailings.	6.7.1
	Hazardous materials	All hazardous materials and dangerous goods will be purchased, transported, stored and used in accordance with the relevant Australian Standards, NOHSC guidelines, Work Health (Occupational Health and Safety) Regulations, Dangerous Goods Regulations and Northern Territory guidelines. Specific training for hazardous goods handling will be provided where necessary.	6.7.1
	Transport of dangerous goods	Transportation of dangerous goods to and from the mine site will be performed by a licensed contractor and will be conducted under the relevant legislative requirements.	6.7.1

Subject	Description	Commitment/Safeguard	Section in EIS
Waste and Hazardous Materials Management (continued)	Fuel storage	Hydrocarbons will be stored in appropriately bunded areas according to Australian standards AS/NZS 1940:1993 and AS/NZS 4452:1997. Bunding will be regularly inspected for damage and repaired as soon as is practicable if any damage is detected. Appropriate licences for storage will be obtained. New storage facilities for aviation fuels in line with the airstrip upgrades will be installed to comply with all relevant regulations and legislation.	6.7.1
	Fuel storage MSDS and Spill Kits	Fuel storage areas will be monitored to ensure hydrocarbons are appropriately contained. Appropriate management will be initiated immediately if contamination is identified, and the contaminated area will be rehabilitated concurrent with operations.	6.5.8
		Spill clean-up kits and Material Safety Data Sheets will be provided on site and accessible to all staff.	6.7.1
	Emergency minimisation	A fire suppression system will be installed throughout the site, the site will be manned 24 hours, 7 days a week, regular site inspections will occur, there will be a no smoking and no alcohol policy across the entire work site, and emergency response procedures will be developed to deal with spills of all hydrocarbons, chemicals and other hazardous substances at various volumes. Smoking will be restricted to the camp and designated smoking areas.	6.7.1
	Blast explosives	Only qualified shotfirers shall be used for blasting and all blasting activities will fully comply with the *Dangerous Goods Act*, Dangerous Goods Regulations and Australian Standard AS2187.2 - 2006.	6.7.1
	Restricted areas	Restricted access areas will be developed to protect historical and cultural sites, and to ensure staff and contractor safety.	6.8.3
Protection of Historic and Cultural Environment	Restricted areas Heritage sites	Whilst on site, workers and visitors will be restricted from accessing culturally sensitive areas. Any inappropriate behaviour will be responded to promptly, and the induction revised if necessary.	6.5.3
		Extensive consultations with stakeholders have commenced, and will continue to be undertaken with respect to possible relocation of Masterton's Grave.	6.8.3
	Heritage sites Archaeo-logical sites	Access to William Masterton’s cave and Masterton Charlie’s grave, both in close proximity to the mining camp, will be restricted, and these sites will be fenced.	6.8.3
		A permit to disturb will be sought to move an identified archaeological scatter, this site will be appropriately recorded by an archaeologist prior to any disturbance.	6.8.3

Subject	Description	Commitment/Safeguard	Section in EIS
Protection of Historic and Cultural Environment (continued)	Archaeo-logical sites	Should archaeological material be uncovered during mining activities, work will cease, and the relevant authorities will be informed and consulted in accordance with the Northern Territory *Heritage and Conservation Act* and the *Sacred Sites Act.*	6.8.3
	Road design and maintenance	Road alignment will ensure perpendicular intersection with creek lines, and will incorporate open floodways using minimal disturbance techniques, which will retain as much of the native vegetation and natural stabilising properties as possible.	6.9.3
Traffic and Transport Management	Road design and maintenance Traffic Management Plan	The Haul Road and access road will be unsealed, thus to minimise the impact on cross flow of surface drainage, these roads will be formed with cross fall with a slope of 4-6% from the road centre. The roads will be maintained through regular grading and all windrows will be removed.	6.9.3
		Use of heavy vehicles will be minimised during the wet season, and the condition of road surfaces, tracks and associated drainage will be monitored at least three times a year; leading up to, during, and coming out of the wet season. Further road formation will be undertaken if the roads begin to degrade.	6.9.3
		The safety of the Redbank Wollogorang intersection and all roads and traffic within the mine site will be managed through a Traffic Management Plan which will include; separation of light and heavy haul vehicles, traffic speed limited to 60km/hr and 20km/hr in camp, haul vehicle right of way, and other restrictions.	6.9.3
	Signage	Signage will be placed on the access road regarding appropriate access and use of the road to access Masterton's cave, at the Haul Road intersection forbidding public access (approvals will be sought from the NT Road Network Division), and 'slow oversize trucks crossing ahead' signs will be placed east and west of the intersections.	6.9.3
	Road use	Constructed roads and vehicular traffic will be restricted to the proposed Haul Road and the nearby general vehicle access road. Speed signs and other appropriate warnings will be erected in prominent locations.	6.2.8
	Blasting activities near roads	Should any blasting activity be required in the vicinity of Wollogorang Road, Redbank will implement temporary road closure, seek appropriate approvals, and provide appropriate warnings, in addition to implementing a tight safety protocol to minimise disturbance to Wollogorang Road traffic.	6.9.3

Subject	Description	Commitment/Safeguard	Section in EIS
Traffic and Transport Management (continued)	Rehabilitation of most project roads	Access roads to historical and cultural sites within the project area (e.g the road to the ceremonial site, and the road to Masterton's Cave) will be maintained for public access, however all formed roads (aside from the access road) will be rehabilitated.	6.9.3
	Dust suppression	A dust collector will reduce airborne dust generation around the primary crusher and the belt feeder. Dust suppression sprays will be mounted at appropriate transfer points.	3.9.1
Air Quality and Noise Management	Dust suppression Noise pollution	Dust suppression will be delivered via water trucks that will also provide emergency fire fighting capacity. In areas where high levels of dust are identified, dust suppression devices such as water cannons and fans may be utilised on a more permanent basis, allowing water trucks to be utilised in a more effective and mobile manner.	6.10.3
		All formed roads will be watered twice daily during dry weather conditions to minimise dust issues and maximise visibility. Water trucks will use either water that has been treated to a standard suitable for release or water extracted from process or dewatering bores.	6.9.3
		Heavily utilised roads will be maintained such that dust does not become an issue.	6.10.3
		Due to the remote location of the project area, noise mitigation activities will focus on the occupational health and safety of employees. Industry best practice techniques and adherence to the relevant Australian Standards will be used when performing activities likely to create excessive noise (e.g. blasting).	6.10.3
	Noise pollution Speed limits	The transport vehicles utilised on public roads will comply with standard registration requirements, such as noise standards.	6.10.3
		Reduced speed limits near communities that may be impacted by increased traffic noise and air pollution will be investigated should public complaints arise.	6.10.3
	Vehicle emissions	Appropriate vehicles will be used in order to minimise the quantity of greenhouse gases being produced by vehicular movement around the mine.	6.10.4

Subject	Description	Commitment/Safeguard	Section in EIS
Greenhouse Gas Emissions	Vehicle emissions FIFO efficiency	Greenhouse gas emissions will be minimised by utilising all available space and or weight capacity on trucks driving to, from and around the mine site as is practicable, thus minimising the overall number of vehicles required.	6.10.4
		Fly in/fly out (FIFO) rosters will be planned so as to maximise the use of each plane taking personnel to and from the site.	6.10.4
Greenhouse Gas Emissions (continued)	Carbon sinks	Rehabilitation of cleared land will involve the re establishment of cleared areas to return the sites back to as close to their original vegetation as is practicable. Over time this should return carbon sinks to close to their original size negating the initial effects of cleared land.	6.10.3
	Water storage	On site effluent will be appropriately stored and disposed such that mosquito breeding sites are not created. Septic systems will be well sealed and tanks and infiltration trenches will be maintained.	6.12, 5.2.2
Biting Insects Management	Water storage Dry season water discharge	Should uncontaminated water require storage (such as the process area retention dam), the pond will be designed to be deep (2m), with steep sides (1:2 slope) and / or a concrete or HDPE liner, such that it provides minimal potential for mosquito breeding.	6.12, 5.2.2
		Artificial items that have been sourced from North Queensland and are capable of ponding rainwater have the potential to introduce the dengue mosquito. This species has drought resistant eggs, thus these items will be treated with a 10% chlorine solution or an appropriate residual insecticide (lambdacyhalothrin or alpha-cypermethrin).	6.12, 5.2.4
		Water storage features such as the process area retention dam will be inspected annually for indicators of potential mosquito breeding, which would be semi-aquatic vegetation and shallow isolated pools as water levels recede. Any potential problems will be mitigated by removing semi-aquatic vegetation and removing silt.	6.12, 5.2.2
		Treated pit water will be discharged to Hanrahan's Creek only for the first year of operation. Following the first year, prolonged dry season discharge will be avoided (dry season discharge can create mosquito breeding grounds) by dispersal by sprinkler irrigation, or by sending treated water to deep, steep-sided ponds from which water will only be discharged during the wet season.	6.12, 5.2.3
	Waste rock dump design	Waste rock stockpile design, especially those at Bluff, will involve diversion drains to divert surface flows around the stockpile to prevent the upstream impoundment of water.	6.12, 5.2.5

Subject	Description	Commitment/Safeguard	Section in EIS
Biting Insects Management (continued)	Road design	The Haul and access roads will have culverts or floodways installed at a level that prevents the upstream impoundment of water for periods greater than 5 consecutive days.	6.12, 5.2.6
	Camp lighting	All sleeping quarters and mess areas in the camp will be appropriately screened, and the screens will be inspected annually to ensure they are not damaged. Yellow lights will be used outside of the construction camp, and light proof curtains will be used to minimise insects being attracted to camp.	6.12, 5.2.7
	Inspections	Periodic inspections of artificial receptacles will be conducted during the wet season at the mine sites and mine camp. Any receptacle found ponding water will be either be disposed of, stored under cover, have drainage holes drilled or treated with an appropriate insecticide on an appropriate schedule.	6.12, 5.2.4
	Inspections Predatory fish stocks	Annual inspections will be conducted of water impoundments for mosquito habitat indicators, septic systems to ensure they are sealed and functioning correctly, and camp insect screens.	6.12, 5.3.2
		Where water quality permits, all areas of artificial water ponding will be stocked with predatory native fish species from Hanrahans Creek or Redbank Creek.	6.12, 5.3.2
	Revegetation trials	Revegetation trials will commence immediately that an area of Waste Rock Dump (WRD) has reached its designated height and capacity.	6.6.3
Decommissioning and Rehabilitation Requirements	Revegetation trials PAF material	Revegetation procedures will endeavour to re-establish a vegetation community of similar composition to that originally removed from the site.	6.5.6
		Seed for revegetation species will be collected from vegetated areas of similar landform that are as close as possible to the revegetation site, in the year preceding revegetation.	6.5.6
		Assessment of Potentially Acid Forming (PAF) material, along with the development of a capping and encapsulation design to minimise acid rock drainage will be informed through trialing a range of potential designs that could meet the long-term closure objectives.	3.6, 6.7.1
	PAF material Progressive	Approaching closure, if the costs of encapsulating the PAF material are high, PAF material may be processed through the plant such that it does not remain on site as a AMD risk.	6.7.1

Subject	Description	Commitment/Safeguard	Section in EIS
Decommissioning and Rehabilitation Requirements (continued)	rehabilitation	Constructed landforms will be revegetated progressively throughout the life of the mining operation and through to completion of the project. The topsoil required to revegetate the site will be removed from disturbed areas at a depth of around 300mm using a double stripping method which stores the top 50mm separately. This method of topsoil management is utilised to concentrate the soil seed bank layer for later use in rehabilitation of the mine site. Topsoil will preferably be stripped when the ground is still slightly moist so soil structure is maintained.	6.6.3, 6.5.6
	Dewatering	Redbank will develop dewatering scenarios to contain contaminant flows and future mining options.	6.3
	Weed management	If weeds are identified in an area to be cleared, topsoil from these areas will be buried immediately in subsoil layers of the developing landform to prevent germination of the seeds.	6.6.3, 6.5.6
	Topsoil stockpiles	Topsoil stockpiles will be constructed no more than 2m in height to maintain seed viability and soil health. Locally common native grass seed will be scattered in the stockpiles to provide cover vegetation, maintain soil organisms and greatly reduce the erosion potential of the site.	6.6.3, 6.5.6
	Topsoil stockpiles Ripping	Topsoil stockpiles will be respread on areas for rehabilitation as soon as possible, with a maximum storage time of one year. Topsoil will be spread around October, just prior to the wet season so vegetation cover can be established in early rains before the onset of the monsoon later in the season.	6.6.3, 6.5.6
		Respread topsoil and subsoil material will be ripped to a depth of 1m in a cross contour direction providing a less compacted soil environment for vegetation establishment.	6.6.3
	Fire	Fire will be excluded from revegetation areas for a period of 10 years to enable seed bank generation in the topsoil.	6.5.6
	TSF Rehabilitation	Rehabilitation of the tailings dam will involve encapsulating tailings with a dry cover constructed with a layer of neutralising dolomitic rock mixed with available clay soils and compacted to create an impermeable layer above the tailings material. A layer of suitable overburden and top soil will then be placed above the capping to enable the establishment of cover vegetation to assist in the rehabilitation of the site.	6.6.3
	Ongoing mosquito control	Upon mine closure, all disturbed areas will be rehabilitated to be free draining where practical, and septic tanks and other artificial receptacles will be either removed or buried. Facilities such as open pit voids and water dams will be left as water holding pits only if they are constructed with steep sides (at least 1:2 slope) and are deep (2m or greater), and are stocked with fish during the rehabilitation process.	6.12, 5.4
	Training	A formal training needs analysis will be conducted annually for all employees and contractors to ensure training opportunities are targeted to specific needs and expansion is made into new areas of expertise.	6.5.3

Subject	Description	Commitment/Safeguard	Section in EIS
Staff and Contractor Skills Base	Training Continuing Consultations	Relevant personnel will be trained in the storage, transport and handling requirements of all chemicals and hazardous materials on-site.	6.7.1
		A variety of consultation practices has been and will continue to be implemented as appropriate during Project development and these include: • One-on-one meetings with major government departments, Members of Parliament and key representative bodies. • Individual consultations and negotiations with the surrounding land owner; • Site visit and meetings with DRDPIFR and Department of Natural Resources, Environment and the Arts (NRETAS), (Division Environment, Heritage and the Arts (EHA) staff; • Meetings and telephone consultations with other relevant Government Departments, Local Government Bodies and Community Organisations. • Letters of information to surrounding landowners and regional Council; and • Group consultations with the Northern Land Council (NLC) and identified Traditional Owners and Native Title Claimants.	8.2
Consultations	Indigenous Consultations	Redbank will work with the NLC to ensure: • A focused approach to compensation and benefits which actively seeks to maximise long term benefits to Traditional Owners (including consideration of employment initiatives and training opportunities); • Inclusion of social and environmental considerations; • Provision of funding to NLC to enable on the ground consultations; and • A transparent approach whereby senior Traditional Owners and NLC representatives will be permitted to inspect the project footprint.	8.3
	Biological Monitoring	The biological monitoring program will be expanded over time to ensure that an adequate baseline of information exists and that future developments are not detrimentally impacting the regional environment.	7.1.2
Environmental Management	EMP	The draft EMP will be updated each year, and submitted to Northern Territory Government authorities as part of Redbank's annual MMP, as required under the *Mining Management Act*.	
	General Management	The environmental legacy will be improved and it will be ensured that there are minimal further environmental impacts resulting from expansion activities.	7.1.3
	General Management Audits	Redbank is committed to; weeds management, fire management, erosion management, and biological monitoring and management.	7.1.2

Subject	Description	Commitment/Safeguard	Section in EIS
Environmental Management (continued)		Annual environmental audits of Redbank's environmental performance against the current WMP and WDL, commitments stated in this EIS, and all relevant and current legislative requirements will be conducted. A final external audit will be conducted post closure to ensure that closure criteria have been met.	6.5.9
	WDL, WMP and MMP	Redbank's Waste Discharge Licence (WDL) and Water Management Plan (WMP) will guide all relevant activities in the project area, and will be updated annually with the Mining Management Plan (MMP) to reflect the latest requirements and monitoring results.	Section 2.4.2.3, WDL: Appendix C, WMP: Appendix B
Legislation and Permits	Timing	All applicable legislation will be followed and all applicable licences and permits will be obtained before the relevant aspects of the project commence.	2.4.2

Appendix H
Water Balance

Sources or Inputs		Water Balance - Redbank Creek			Losses or Discharges	
Dry Weather: No Rain						
Redbank Open Pit						
Rain	0		(Pit Diameter: 180m)			SF Plant
Influx	149,600	149,600		149,600	149,600	Redbank Creek
Azurite Open Pit						
Rain	0		(Pit Diameter: 125m)			SF Plant
Influx	149,600	149,600		149,600	149,600	Redbank Creek
			Redbank/Azurite Waste Rock Dump			
Rain	0		(Area: 8ha)		0	Runoff
		0		17,500	17,500	Seepage: Redbank Creek
Bluff Open Pit						
Rain	0		(Pit Diameter: 350m)			SF Plant
Influx	149,600	149,600		149,600	149,600	Redbank Creek
			Bluff Waste Rock Dump			
Rain	0		(Area: 15ha)		0	Runoff
		0		32,700	32,700	Seepage: Redbank Creek
Wet Weather: 1,433mm - Wollogorang: 13-year Maximum Average						
Redbank Open Pit						
Rain	145,800		(Pit Diameter: 180m)			SF Plant
Influx	149,600	295,400		295,400	295,400	Redbank Creek
Azurite Open Pit						
Rain	70,400		(Pit Diameter: 125m)			SF Plant
Influx	149,600	220,000		220,000	220,000	Redbank Creek
			Redbank and Azurite Waste Rock Dump			
Rain	114,700		(Area: 8ha)		91,800	Runoff
		114,700		114,800	23,000	Seepage: Redbank Creek
Bluff Open Pit						
Rain	551,300		(Pit Diameter: 350m)			SF Plant
Influx	149,600	700,900		700,900	700,900	Redbank Creek
			Bluff Waste Rock Dump			
Rain	215,000		(Area: 15ha)		172,000	Runoff
		215,000		215,000	43,000	Seepage: Redbank Creek
Average: 1,089mm - Wollogorang: 13-year Average						
Redbank Open Pit						
Rain	110,800		(Pit Diameter: 180m)			SF Plant
Influx	149,600	260,400		260,400	260,400	Redbank Creek
Azurite Open Pit						
Rain	53,500		(Pit Diameter: 125m)			SF Plant
Influx	149,600	203,100		203,100	203,100	Redbank Creek
			Redbank and Azurite Waste Rock Dump			
Rain	87,200		(Area: 8ha)		69,700	Runoff
		87,200		87,200	17,500	Seepage: Redbank Creek
Bluff Open Pit						
Rain	418,900		(Pit Diameter: 350m)			SF Plant
Influx	149,600	568,500		568,500	568,500	Redbank Creek
			Bluff Waste Rock Dump			
Rain	163,400		(Area: 15ha)		130,700	Runoff
		163,400		163,400	32,700	Seepage: Redbank Creek

Notes:

Quantities in kL/a.

Influx: estimated at 50m depth; estimations assume steady-state flux with no increase due to annual recharge.

Influx: controls include dewatering bores and pit sumps.

Influx: estimations to be revised by modelling.

Runoff from WRDs estimated at 80% and seepage (infiltration) at 20% of rainfall.

Discharge and treat at source preferred option - discharge to SF Plant as per the water demand of the plant.

Discharge of rain/influx into open pit to Redbank Creek requires settlement and liming to pH 7.0 prior to release.

Discharge of influx from bores into Redbank Creek may require liming to pH 7.0 prior to release.

Overflow of runoff from WRD may require liming to pH 7.0 prior to release.

Sources or Inputs			Water Balance Sandy Flat			Losses or Discharges
Dry Weather: No Rain - Treatment of SF Pit Water						
Sandy Flat Open Pit						
Rain	0		(Pit Diameter: 180m)		21,600	Seepage: Hanrahans Creek
Runoff	0		(Pit Area: 2.42ha)		43,400	Evaporation
Influx (Seepage)	65,000	65,000	(Crest Level: 170.0mAHD)	375,600	310,600	SF Treatment Plant [1]
(1) Projected Pit Water Level (310,600m^3 Pit Water Treated): 152.0mAHD - Drawdown 18m (Hanrahans Pool: 164.4mAHD)						
Sandy Flat Waste Rock Dump (Existing)						
Rain	0		(Area: 3.56ha)		0	Runoff: SF Pit
		0		23,300	23,300	Seepage: Pit/Hanrahans Creek
Sandy Flat Plant						
Rain	0		(Plant Capacity: Care and Maintenance)		0	Discharge: Septic Tank
Bores (Production)	0		(Plant Area: 5.45ha)		0	Runoff: SF Pit
SF Pit	310,600		(Stockpiles and VAT Leaches: 10.03ha)		16,900	Seepage: Pit
Tailings Return Water	0	310,600		327,500	310,600	Tailings/Storage
Sand Flat Tailings Storage Facility (Existing)						
Rain	0		(Area: 5.69ha)		0	Runoff: SF Pit
Plant	310,600				76,400	Evaporation
					0	Retention
					24,800	Seepage: Pit/Hanrahans Creek
					209,400	Discharge: Hanrahans Creek
		310,600		310,600	0	Plant
Wet Weather: 1,433mm - Wollogorang: 13-year Maximum Average						
Sandy Flat Open Pit						
Rain	34,700		(Pit Diameter: 180m)		22,500	Seepage: Hanrahans Creek
Runoff	134,000		(Pit Area: 2.42ha)		43,400	Evaporation
Influx (Seepage)	65,900	234,600	(Crest Level: 170.0mAHD)	376,500	310,600	SF Treatment Plant [1]
(1) Projected Pit Water Level (310,600m^3 Pit Water Treated): 162.0mAHD - Drawdown 8m (Hanrahans Pool: 164.4mAHD)						
Sandy Flat Waste Rock Dump (Existing)						
Rain	51,100		(Area: 3.56ha)		27,800	Runoff: SF Pit
		51,100		51,100	23,300	Seepage: Pit/Hanrahans Creek
Sandy Flat Plant						
Rain	51,100		(Plant Capacity: Care and Maintenance)		2,200	Discharge: Septic Tank
Bores (Production)	3,600		(Plant Area: 5.45ha)		40,900	Runoff: SF Pit
SF Pit	310,600		(Stockpiles and VAT Leaches: 10.03ha)		11,600	Seepage: Pit
Tailings Return Water	0	365,300		365,300	310,600	Tailings/Storage
Sand Flat Tailings Storage Facility (Existing)						
Rain	81,600		(Area: 5.69ha)		65,300	Runoff: SF Pit
Plant	310,600				76,400	Evaporation
					0	Retention
					31,000	Seepage: Pit/Hanrahans Creek
					219,500	Discharge: Hanrahans Creek
		392,200		392,200	0	Plant
Average: 1,089mm - Wollogorang: 13-year Average						
Sandy Flat Open Pit						
Rain	26,400		(Pit Diameter: 180m)		20,000	Seepage: Hanrahans Creek
Runoff	96,200		(Pit Area: 2.42ha)		43,400	Evaporation
Influx (Seepage)	63,400	186,000	(Crest Level: 170.0mAHD)	374,000	310,600	SF Treatment Plant [1]
(1) Projected Pit Water Level (310,600m^3 Pit Water Treated): 160.0mAHD - Drawdown 10m (Hanrahans Pool: 164.4mAHD)						
Sandy Flat Waste Rock Dump (Existing)						
Rain	38,800		(Area: 3.56ha)		15,500	Runoff: SF Pit
		38,800		38,800	23,300	Seepage: Pit/Hanrahans Creek
Sandy Flat Plant						
Rain	38,800		(Plant Capacity: Care and Maintenance)		2,200	Discharge: Septic Tank
Bores (Production)	3,600		(Plant Area: 5.45ha)		31,100	Runoff: SF Pit
SF Pit	310,600		(Stockpiles and VAT Leaches: 10.03ha)		9,100	Seepage: Pit
Tailings Return Water	0	353,000		353,000	310,600	Tailings/Storage
Sand Flat Tailings Storage Facility (Existing)						
Rain	62,000		(Area: 5.69ha)		49,600	Runoff: SF Pit
Plant	310,600				76,400	Evaporation
					0	Retention
					31,000	Seepage: Pit/Hanrahans Creek
					215,600	Discharge: Hanrahans Creek
		372,600		372,600	0	Plant

Notes:

Quantities in kL/a.
Water balance subsequent to dewatering of pit.
Influx: estimated at 50m depth; estimations assume steady-state flux with no increase due to annual recharge.
Influx: controls include dewatering bores and pit sumps.
Influx: estimations to be revised by modelling.
Influx into SF Pit = Seepage from Plant, WRD and TSF.
Seepage coefficients: 5% Plant Area; 70% WRD and 40% TSF.
Runoff coefficients: 80% Plant Area; 30% WRD and 60% TSF.
Runoff from Plant and Infrastructure, WRD and TSF drain to SF Pit.
Rain/influx into open pit must be used in plant and not released.
Discharge of influx from bores into Hanrahans Creek will require liming to pH 7.0 prior to release.
Exisitng WRD to be processed and/or to be placed in proposed new WRD.
Overflow of runoff from proposed new WRDs may require liming to pH 7.0 prior to release.

Sandy Flat Pit Water Balance - Water Treatment

Sandy Flat Open Pit (Pit Crest Level: 170.0mAHD, Area: 2.42ha)

Month	Rain	Abstraction	Cumulative Abstraction	Evaporation	Discharge	dVolume	Seepage In or Storage	Seepage Out (to Creek)	Level	dVolume$^{Pit\ Level}$	Cumulative dVolume$^{Pit\ Level}$	Drawdown	Cumulative Drawdown
31-October-2009	0	7,198	7,198	5,610	0	-12,808		2,411	169.28	15,219	15,219	0.73	0.73
30-November-2009	1,234	27,432	34,630	5,178	0	-31,376	7,461		168.20	23,915	39,134	1.11	1.84
31-December-2009	2,700	32,024	66,654	4,198	400	-33,923	14,992		167.30	18,931	58,065	0.88	2.72
31-January-2010				3,647	6,600	-10,247							
28-February-2010													
31-March-2010													
30-April-2010													
31-May-2010						Compare with dVolume Pit							
30-June-2010		To be confirmed			Refer Calculations		Storage in fractures around pit						
31-July-2010							Refer photos of open pit						
31-August-2010													
30-September-2010													
31-October-2010													
30-November-2010													
31-December-2010													
Total	**3,934**	**66,654**	**-**	**18,633**	**7,000**	**-88,354**	**22,453**	**2,411**	**-**	**58,065**	**-**	**2.72**	**-**

Notes: Quantities in kL/a; levels in RL mAHD; drawdown in m.

Tailings Storage Facility Water Balance

(Area: 5.69ha)

Month	Rain	Disposal	Cumulative Disposal	Evaporation	Discharge	dStorage	Seepage (to SF Pit)
31-October-2009	0	7,198	7,198	6,879		319	
30-November-2009	3,027	27,432	34,630	6,350		-30,755	
31-December-2009	6,919	32,024	66,654	5,380		-30,485	
31-January-2010				4,674		-4,674	
28-February-2010							
31-March-2010							
30-April-2010							
31-May-2010							
30-June-2010		To be confirmed		Disposal Area?	To Creek?		
31-July-2010							
31-August-2010							
30-September-2010							
31-October-2010							
30-November-2010							
31-December-2010							
Total	**9,946**	**66,654**		**23,283**	**0**	**-65,595**	**0**

Notes: Quantities in kL/a; levels in RL mAHD; drawdown in m.

Sources or Inputs			Water Balance Sandy Flat Year 1 and 2		Losses or Discharges	
Dry Weather: No Rain - Treatment of SF Pit Water						
Sandy Flat Open Pit						
Rain	0		(Pit Diameter: 180m)		0 Seepage: Hanrahans Creek	
Runoff	0		(Pit Area: 2.42ha)		43,400 Evaporation	
Influx (Seepage)	65,000				310,600 SF Treatment Plant [1]	
		65,000	(Crest Level: 170.0mAHD)	608,100	254,100 SF Processing Plant [1]	543,100
(1) Projected Pit Water Level (310,600m^3 Pit Water Treated/254100m^3 Pit Water for Process): 124.0mAHD - Drawdown 56m: **Dry** (Hanrahans Pool: 164.4mAHD)						
Sandy Flat Waste Rock Dump (Existing)						
Rain	0		(Area: 3.56ha)		0 Runoff: SF Pit	
		0		23,300	23,300 Seepage: Pit/Hanrahans Creek	
Sandy Flat Plant						
Rain	0		(Plant Capacity: Care and Maintenance)		2,200 Discharge: Septic Tank	
Bores (Production)	3,600		(Plant Area: 5.45ha)		0 Runoff: SF Pit	
SF Pit: Treatment	310,600		(Stockpiles and VAT Leaches: 10.03ha)		16,900 Seepage: Pit	
SF Pit: Process	254,100	Recycling?			310,600 Tailings/Storage	
Tailings Return Water	0	568,300		329,700		
Sand Flat Tailings Storage Facility (Existing)						
Rain	0		(Area: 5.69ha)		0 Runoff: SF Pit	
Plant	310,600		Dry Stack Tailings		76,400 Evaporation	
					0 Retention	
					24,800 Seepage: Pit/Hanrahans Creek	
					209,400 Discharge: Hanrahans Creek	
		310,600		310,600	0 Plant	
Wet Weather: 1,433mm - Wollogorang: 13-year Maximum Average						
Sandy Flat Open Pit						
Rain	34,700		(Pit Diameter: 180m)		0 Seepage: Hanrahans Creek	
Runoff	134,000		(Pit Area: 2.42ha)		43,400 Evaporation	
Influx (Seepage)	68,700		(Crest Level: 170.0mAHD)		310,600 SF Treatment Plant [1]	
		237,400		608,100	254,100 SF Processing Plant [1]	370,700
(1) Projected Pit Water Level (310,600m^3 Pit Water Treated/254100m^3 Pit Water for Process): 148.0mAHD - Drawdown 22m (Hanrahans Pool: 164.4mAHD)						
Sandy Flat Waste Rock Dump (Existing)						
Rain	51,100		(Area: 3.56ha)		27,800 Runoff: SF Pit	
		51,100		51,100	23,300 Seepage: Pit/Hanrahans Creek	
Sandy Flat Plant						
Rain	51,100		(Plant Capacity: Care and Maintenance)		2,200 Discharge: Septic Tank	
Bores (Production)	3,600		(Plant Area: 5.45ha)		40,900 Runoff: SF Pit	
SF Pit: Treatment	310,600				11,600 Seepage: Pit	
SF Pit: Process	254,100		(Stockpiles and VAT Leaches: 10.03ha)		310,600 Tailings/Storage	
Tailings Return Water	0	619,400		365,300		
Sand Flat Tailings Storage Facility (Existing)						
Rain	81,600		(Area: 5.69ha)		65,300 Runoff: SF Pit	
Plant	310,600				76,400 Evaporation	
					0 Retention	
					31,000 Seepage: Pit/Hanrahans Creek	
					219,500 Discharge: Hanrahans Creek	
		392,200		392,200	0 Plant	
Average: 1,089mm - Wollogorang: 13-year Average						
Sandy Flat Open Pit						
Rain	26,400		(Pit Diameter: 180m)		0 Seepage: Hanrahans Creek	
Runoff	96,200		(Pit Area: 2.42ha)		43,400 Evaporation	
Influx (Seepage)	77,600		(Crest Level: 170.0mAHD)		310,600 SF Treatment Plant [1]	
		200,200		608,100	254,100 SF Processing Plant [1]	407,900
(1) Projected Pit Water Level (310,600m^3 Pit Water Treated/254100m^3 Pit Water for Process): 146.0mAHD - Drawdown 24m (Hanrahans Pool: 164.4mAHD)						
Sandy Flat Waste Rock Dump (Existing)						
Rain	38,800		(Area: 3.56ha)		15,500 Runoff: SF Pit	
		38,800		38,800	23,300 Seepage: Pit/Hanrahans Creek	
Sandy Flat Plant						
Rain	38,800		(Plant Capacity: Care and Maintenance)		2,200 Discharge: Septic Tank	
Bores (Production)	3,600		(Plant Area: 5.45ha)		31,100 Runoff: SF Pit	
SF Pit	254,100		(Stockpiles and VAT Leaches: 10.03ha)		9,100 Seepage: Pit	
Tailings Return Water	0	296,500		296,500	254,100 Tailings/Storage	
Sand Flat Tailings Storage Facility (Existing)						
Rain	62,000		(Area: 5.69ha)		49,600 Runoff: SF Pit	
Plant	310,600				76,400 Evaporation	
					0 Retention	
					31,000 Seepage: Pit/Hanrahans Creek	
					215,600 Discharge: Hanrahans Creek	
		372,600		372,600	0 Plant	

Notes:

Quantities in kL/a.
Water balance subsequent to dewatering of pit.
Influx: estimated at 50m depth; estimations assume steady-state flux with no increase due to annual recharge.
Influx: controls include dewatering bores and pit sumps.
Influx: estimations to be revised by modelling.
Influx into SF Pit = Seepage from Plant, WRD and TSF.
Seepage coefficients: 5% Plant Area; 70% WRD and 40% TSF.
Runoff coefficients: 80% Plant Area; 30% WRD and 60% TSF.
Runoff from Plant and Infrastructure, WRD and TSF drain to SF Pit.
Rain/influx into open pit must be used in plant and not released.
Discharge of influx from bores into Hanrahans Creek will require liming to pH 7.0 prior to release.
Exisitng WRD to be processed and/or to be placed in proposed new WRD.
Overflow of runoff from proposed new WRDs may require liming to pH 7.0 prior to release.

Appendix I
Trigger Level Details

Trigger Level Details for Redbank Water Monitoring

Redbank Water Quality Management Objectives

Long term management objectives for Redbank ERL are to:

1. Minimise potential for surface and groundwater contamination by removing legacy issues or minimising the potential for these contamination sources to interact with groundwater and uncontaminated surface water.
2. Ensure the condition of surface water and groundwater systems are not reduced or further impacted as a consequence of expanded mining activities.

Redbank will be refining the water quality management protocol in their revised Water Management Plan for submission to DRDPIFR at the end of February 2010. This WMP will outline:

- An overarching adaptive management approach;
- The context and vital attributes of the systems (e.g key drivers);
- Broad management objectives;
- The role of triggers, thresholds and targets;
- Specific management priorities and objectives (both short and long term);
- The monitoring regime (what will be measured, method, spatial and temporal focus);
- Targets, thresholds and triggers which will influence management actions;
- Management responses when trigger values are exceeded; and
- Annual and periodic review of the management system will be outlined.

The Redbank Water Situation

Through legacy issues, the mine site contains and contributes to contaminated groundwater and surface water (Hanrahan's Creek) systems. Redbank Mines have committed to remediating the legacy issues in the process of expanding existing operations.

In order to manage proposed expansions, Redbank will contain and progressively reduce legacy impacts whilst also minimising the potential for new contamination issues to eventuate through mining and processing further oxide materials. There are three main surface water catchments within Redbank's ERL boundary:

- Hanrahan's Creek, which has been heavily impacted by past mine activities and continues to be impacted by legacy issues;
- Redbank Creek, in relatively pristine condition, separated from legacy impacts in terms of surfacewater, but may have some groundwater connection; and
- Branch/Seven Mile Creek, appears to be separated from legacy impacts and therefore in a relatively pristine condition.

The Redbank Mine water management system is complicated through numerous potential streams of impact to ground and surface water quality:

- There is a point source discharge on site at Hanrahan's Ck junction (decant water from the TSF as authorised in the WDL); but also
- Runoff, i.e. risk during extreme rainfall of breaching of bunds and other containment devices;

- Non-point sources where legacy contaminants potentially leach to groundwater;
- Existing groundwater contamination of unknown vertical and horizontal extent, and unknown direction of flow; and also
- Remobilisation (first flush events picking up residual contaminants) further influences surface water quality.

Background to Northern Tropical Aquatic Systems

Tropical surface and ground water systems are extremely complex and often poorly understood. Hydrology is undoubtedly the primary driver of water quality processes (Butler 2008). Tropical river systems are strongly influenced by distinct wet and dry seasons. For many systems inland from the coast, such as Redbank, the wet season is not the only time it rains, but is the time of year in which most of the annual rainfall will be received. In Redbank's case, stream flows can be extremely episodic and driven by runoff from a few brief but intense rainfall episodes associated with tropical lows and cyclones (Butler 2008).

Tropical systems are typified by an annual dry season drought period. Most streams stop flowing at some stage during a normal year, or sustain a flow rate so slow that for most of the year the streams exhibit limnological traits more characteristic of lakes than streams (Butler 2008).

Many rivers don't receive sufficient runoff to generate significant stream flow until at least November-December (Butler 2008). When the catchments and river channels are fully saturated, and elevated wet season baseflows are established, flows can become highly erratic as the system responds to subsequent rains (Butler 2008).

In addition to a high spatial variability, large catchments can comprise a complex mix of sub catchment types (sometimes on a very fine scale), thus adjacent catchments in similar landforms can exhibit substantially different hydrology (Butler 2008).

Water quality parameters, especially dissolved oxygen (DO), carbon dioxide (and therefore pH), nutrients, colour, temperature and chlorophyll under the limnological conditions that typically develop over the dry season are so strongly influenced by natural biological processes that the aquatic ecosystem itself is very often the major determinant of parameter concentrations in the water column (Butler 2008).

The strong spatial variability and erratic nature of tropical river systems has begun to be researched by respected research institutions only recently. This fact poses many challenges in discerning acceptable and natural parameters for a healthy tropical system such as Redbank, as well as challenges to setting an acceptable pace of rehabilitation for degraded systems.

Monitoring approach for highly complex systems

Redbank's monitoring regime must accommodate the natural variation within tropical waterways.

Monitoring Objectives for highly impacted systems (Hanrahan's Creek) include:

- Early detection of additional sources of degradation to water quality;
- Improved understanding of the interaction between surface flows and ground water; and
- Tracking response to rehabilitation and containment of legacy issues (which may include considerable time lags).

Monitoring objectives for relatively intact systems (Redbank Creek) include:

- Improving understanding of the natural limits and parameters of the regional surface and ground water systems; and

- Early detection of any deviations from the accepted thresholds of the natural system resulting from expansion activities.

Existing contamination issues will be monitored using the same parameters as those used to measure potential contaminants from expansion and include low pH, and high metal loads – variables that interact in the sense that acidic waters mobilise greater dissolved metal loads.

To account for seasonal variations at the Redbank site, it is necessary to group the reference data and derive a number of trigger values corresponding to the key seasonal periods. Thus for groundwater; 'wet' and 'dry' triggers are necessary, and for surface water; 'first flush', 'high flow' and 'low/no flow' triggers will be set.

Points Considered to Develop Trigger Levels

- Whilst Redbank have designed the monitoring system to be as responsive as possible, there will be time lags in detecting impact. Other challenges include:
    - Limited baseline records due to limited stream flow;
    - Single data entries;
    - Historical baseline data often has total rather than dissolved metals, which leaves data open to greater fluctuations and greater room for error;
    - Historical surface water data does not include a measure for relating stream flow (this will have to be deduced from historical local rainfall data); and
    - Local trigger values are required to account for a high degree of variability in chemical stressors, however sufficient data to develop these local values is not yet available.
- Concentrations of contaminants in Hanrahan's Creek receded slowly during 2009 due to remediation efforts; however contaminant concentrations remain high at certain times of flow due to residual contamination.
- The natural ambient concentrations of many parameters in the tropics exceed the ANZECC 2000 guidelines, a fact recognised by TRaCK, who are currently researching and developing equivalent guideline concentrations for tropical rivers.
- Thus, ANZECC 2000 guidelines will be used as target levels (short term for Redbank Creek and as long term target levels for Hanrahan's Creek), taking into account ambient or natural concentrations to be determined by continued monitoring at reference sites.
- Residual contamination levels (i.e. precipitated metals in the sediments of the stream beds likely to be picked up with first flows) will be measured through sediment samples, the first sediment monitoring event planned for late dry season 2010 – results of this testing will inform feasibility of stream water quality improvement targets.
- Several reference sites have been carefully selected, and further reference sites may be added to the monitoring program in the future if the integrity of current reference sites are compromised.
- Percentiles are currently only based on limited sample numbers, however, data on reference sites will continue to be collected over time, and as such, data will become more statistically viable.

Redbank Commitment to Surface Water

Due to residual contamination potential in Hanrahan's Creek (and possibly Redbank Creek), Redbank cannot commit to improvement in stream water quality in the short term. Sediment test results from the stream beds, planned for Sep/Oct 2010, will inform achievable water quality targets.

At this stage, Redbank can only safely commit to improving the quality of surface water that leaves the mine. The quality of runoff water has been significantly improved, and only water of high quality (tested and reported upon as per WDL) is now discharged into the outside environment.

As such, Redbank surface water quality targets involve the following;

- Discharge water to be at a pH of 7, and in accordance with the latest WDL;
- Maintain water quality within waterways in the **short term**; and
- Improve water quality in Hanrahan's Creek by 50% in five years time (subject to residual contamination results).

Reference sites, upstream or separated from potential expansion impacts, will continue to be sampled under the monitoring regime, resulting in an increasingly comprehensive dataset. Surface water monitoring data will be stored against date and 'flow' descriptions – such as 'first flush', or 'high/low/no flow'.

Through matching flow measurements during a few selected spates with photographs from selected photopoints at each surface water monitoring site, a set of typical photographs for various flow rates can eventually be established. These photographs will facilitate flow rate estimates, an added parameter necessary for surface water monitoring. Measures of flow can then be assessed by technicians in the field based on the photographic prompts.

To gather more information on residual contamination, sediments in the watercourses will be sampled from the same monitoring sites in 2010. The 'first major flush' event will be captured each year in addition to monthly monitoring in order to assess remobilisation of contaminants and to help account for fluctuations in parameters.

Short Term Surface Water Targets and Triggers

Hanrahan's Creek: To maintain water quality below the ambient maximum concentrations for relevant parameters at the same site historically, relative to flow rates and first flush events. Hanrahan's Creek reference will be historical data from the same site during the same flow events for previous years. Trigger levels are considered anything outside the 80th percentile of reference data when considering dissolved metals, and for level of acidity (pH), below the 20th percentile of reference system data.

Redbank Creek: To maintain water quality below the ambient maximum concentrations for relevant parameters at the most appropriate reference site, relative to flow rates and first flush events. Redbank Creek reference sites will include upstream Redbank Creek and also Echo Creek upstream of potential impacts, and Seven Mile/Branch Creek. Trigger levels are considered anything outside the 80th percentile of reference data when considering dissolved metals across all sites, and for level of acidity (pH), below the 20th percentile of reference system data.

Redbank Commitment to Groundwater

Groundwater flow models will be developed following the installation of up to ten new EMBs within the project area in 2010. Groundwater flow models will significantly enhance Redbank's ability to trace groundwater quality issues to a particular element of the mine site.

The groundwater at some areas of the mine site is contaminated through legacy issues, however further bores and testing is planned in 2010 to determine the extent and flow of contamination. Until this is determined, medium to long term targets to improve groundwater quality cannot be set. Redbank can only safely commit to preventing interaction between potentially contaminated material and the groundwater system.

As such, groundwater quality targets involve the following;

- Prevent interaction between groundwater and potentially contaminated materials; and
- Maintain quality of groundwater (taking season into account) in the **short term**.

Short term Groundwater Targets and Triggers

All new infrastructure will be designed to minimise the risk of contaminants, sediment, or PAF material to interact with the groundwater system and have inbuilt preventative measures such as sediment traps to further reduce risk.

To maintain water quality below the ambient maximum concentrations for relevant parameters at the most appropriate reference site, relative to seasonal variations. Maximum concentrations are considered values within the 80^{th} percentile of reference data for dissolved metals across all sites, and the level of acidity (pH) within the 20^{th} percentile of reference system data.

Reference data will be grouped into either 'wet' or 'dry' seasons, and monitoring data will be compared back to the relevant season based on sample timing.

In the event of Exceeding Trigger Levels

Management response will be triggered by a continuously monitored variable exceeding maximum percentile values that represent tolerable levels within that system. Trigger Concentration exceedance of groundwater or surface water for any parameter will be immediately followed up with daily monitoring over 5 consecutive days at those sites that parameters have triggered. If consecutive results show continued exceedance of parameters, remedial actions will be put into action (**Appendix C** of this supplement), guided by location and type of identified contamination.

Reference

Butler, B. 2008. Report 5: Water quality. In G.P. Lukacs and C.M. Finlayson (eds) 2008. *A Compendium of Ecological Information on Australia's Northern Tropical Rivers. Sub-project 1 ofAustralia's Tropical Rivers – an integrated data assessment and analysis (DET18)*. A report to Land & Water Australia. National Centre for Tropical Wetland Research, Townsville, Queensland.