

20.2 Rehabilitation Strategy (1)

EPA has asked that the Supplement provides an indication of timing with respect to the areas of the OEF that will become available for rehabilitation or proposed field trials if mining plans change. This will be essential to determine what works at the site and to provide opportunities for monitoring rehabilitation success prior to mine closure.

The OEF will be built in stages with three stages proposed for the PAF side and three for the NAF side. For convenience these have been called the southern, central and northern stages. The years that each stage will start and finish are given in the following table. Rehabilitation of each OEF stage will begin once earthworks are completed. The test pit OEF when, completed, will be used as a ROM area until the end of the mine life after which time it will be rehabilitated as part of mine closure. The in-pit dumps will be used until mine closure after which time they will be located at the bottom of the flooded pit.

Dump Area	Start Year	End Year
Test Pit OEF	2005	2007
PAF OEF (southern)	2006	2012
PAF OEF (central)	2011	2016
PAF OEF (northern)	2015	2021
NAF OEF (southern)	2008	2011
NAF OEF (central)	2011	2014
NAF OEF (northern)	2014	2018
In-pit dumps	2021	2029

Field rehabilitation trials will be undertaken when the first OEF stages are sufficiently large and enough materials are available to trial the landform concept (particularly slope length, cover type, and durability) to evaluate erosion stability performance which is critical for sustainability of the rehabilitated OEF. This approach recognises that erosion stability must be based on site-specific factors including climate, materials, hydrology, and vegetation. Results of the trials will be reported to the EPA via the annual monitoring reports and the detailed rehabilitation design will be subject to approval through the Mine Management Plan process.

The detailed rehabilitation design will be defined by 2011 (or earlier if climatic conditions permit successful trials) and updated as required during the mine life to be commensurate with best practice at the time.

20.2.2 Progressive Rehabilitation (4)

DHCS has asked that the ponds created in the marine spoil emplacement area at Bing Bong be inspected for mosquito breeding during the wet season, as part of the larval mosquito monitoring program. The Medical Entomology Branch should be contacted for advice on mosquito control if

mosquito breeding is found. The ponds should be deep and steep sided, to prevent the creation of shallow isolated areas suitable for mosquito breeding.

The ponds in the marine spoil emplacement area at Bing Bong will be inspected for mosquito breeding during the wet season as part of the larval mosquito monitoring program. MRM will contact the Medical Entomology Branch for advice on mosquito control if mosquito breeding is found.

20.3.3 Closure Criteria (1, 2, 7)

EPA has asked why the final year of reporting in year eight signals the completion of rehabilitation and what actions are proposed if results indicate that vegetation has not stabilised at the year eight final stage of reporting.

Year 8 of the post-closure management and monitoring program will not necessarily signal the completion of the program. As discussed in the draft EIS, the need for any ongoing monitoring will be reassessed at the end of Year 8. If the monitoring results indicate that the closure criteria have not yet been met, the management and monitoring program will continue until the mine closure criteria are achieved.

EPA has asked why revegetation assessment will be conducted using transects for six years instead of eight years.

Based on previous experience, it is expected that the success of revegetation will be able to be determined within six years by which time it is expected to be stable and self-sustaining. However, should this not be the case (due to a number of variables such as climatic conditions), remedial actions and/or ongoing monitoring will continue.

EPA has asked that monitoring of fauna in the rehabilitation be considered given the importance of fauna to succession in revegetated sites, and suggested that landscape function analysis should also be discussed.

The monitoring program will concentrate on ensuring that the agreed closure criteria are being achieved. Should fauna succession in revegetated sites or landscape function be included in the closure criteria they will be included in the monitoring program.

EPA considers that MRM should consider the revegetation of the OEF batters, which will be highly visible and which will form the majority of visual impact. This should be discussed with reference to the nearest comparable landform, Mount Stubbs.

MRM will commit to revegetating the OEF batters visible from the Carpentaria Highway. Topsoil will be placed within the outer rock layer and vegetation established using a combination of direct seeding and seedling planting. The vegetation will include a mixture of grasses, shrubs and trees of native species that exist in the lowland woodland communities where the OEF is located.

Once the vegetation becomes established on the berms and batters of the OEF it will become more visually compatible with Mount Stubs which will be behind the OEF when viewed from the Carpentaria Highway.

DPIFM consider that groundwater quality monitoring results should indicate an improving trend not only that they are ‘not declining’.

This measure is made in reference to background water quality levels. The measure of success is that groundwater levels do not decline below background levels (ie. from bores located upgradient from the mine). Improvement beyond background levels will not be achievable.

DPIFM has asked what are the specified guidelines referred to in this section of the EIS

The guidelines will be the background groundwater quality measured at reference bores remote from potential sources of contamination.

ECNT has challenged the statement in Table 20.2 of the EIS that groundwater contamination will pose no risk to biota following rehabilitation.

Table 20.2 lists the mine’s closure criteria and the proposed methods for achieving compliance. Once the groundwater no longer poses a risk to biota is an indicator that active intervention in the site’s water management system is no longer required.

ECNT has challenged the statement in Table 20.2 of the EIS that no archaeological sites exist on the disturbed area.

The above compliance requirement listed in Table 2.2 goes on to state that “Traditional owners will be consulted in the decommissioning plan where there will be an opportunity to discuss post-mining management of identified sites”. Thus if any sites are identified within the lease area that have not been disturbed by the project their management will include traditional owner involvement.

20.3.4 Closure Commitments (4)

DHCS has asked that an additional closure commitment should be that the mine site and Bing Bong Port will be rehabilitated in a manner that ensures no actual or potential artificial mosquito breeding sites remain.

MRM will include as a closure commitment that the mine site and Bing Bong Port will be rehabilitated in a manner that ensures no actual or potential artificial mosquito breeding sites remain.

20.3.5 Final Land Use (2)

DPIFM notes that agreement with relevant stakeholders for the final land use of the site is not yet in place and considers that significant aspects of the operation such as open pit voids, TSF and OEF, should have preferred broad closure options incorporated into front-end design as soon as reasonably practicable.

The closure strategies for the open pit void (flooded), TSF (stabilised and revegetated) and OEF (stabilised and revegetated) have been determined and are discussed in the draft EIS. The final land use options that are yet to be agreed with relevant stakeholders relate to the use of the total lease area. Whatever land use is agreed for the lease will need to take into account the presence of the pit void, TSF and OEF whose rehabilitation has been included in the front-end design.

DPIFM considers that objective of closure and the criteria need to be agreed by all relevant stakeholders but it should not prevent the company from undertaking concurrent rehabilitation for the purpose of reducing operational impact.

MRM is committed to progressive rehabilitation as described in the draft EIS. This will be undertaken as soon as possible during the project life and will not await finalisation of agreement of the closure criteria.

20.3.6 Security (7)

ECNT believes that a \$12 million rehabilitation bond is inadequate for a mine proposal likely to leave a series of ongoing and long-term environmental problems needing to be contained or remedied.

The current rehabilitation bond relates to the underground operations. As the open cut mine introduces different environmental liabilities, MRM will enter into discussions with the NT Government about a new security bonding arrangement for the open cut project.

20.3.7 Closure Strategy – Mine (1, 2, 3, 4, 6, 7, 9, 12, 13)

EPA has asked how will the preferred option for the final void of flushing by breaching the flood protection bund to allow flood flows into the pit be assured and maintained post closure.

The width and location of the breaches in the flood protection bund will be designed to ensure that flood flows will enter the pit. The breached bund and the flood flow paths will be stabilised against erosion by rock armouring. The success of this arrangement will be monitored during the post-closure management and monitoring program.

EPA considers that the final void be treated as a stratified water body and that modelling be undertaken to predict how this 'lake' will behave in the long term and how flows from the pit might impact on the downstream environment of the McArthur River.

MRM will undertake extensive data collection during the mine life and detailed modelling of water body and water behaviour (particularly stratification) as part of detailed mine-closure planning prior to closure

of the mine. The detailed modelling of stratification (either thermal or salinity stratification) requires extensive data regarding temperature and salinity of river flows from the upstream catchment. MRM will install automatic monitoring equipment upstream of the mine to collect the necessary data during the mine life.

EPA has doubts that the integrity of the rock-lined drainage chutes at the OEF will be maintained in the long term with the continual concentration of water flowing through them.

Rock chutes will be trialled as part of rehabilitation trials and used strategically for erosion and sediment control during the operational phase when the OEF is being constructed. Grading of the rock size will be considered, one of several critical factors for the success of rock chutes. Another will be the selection of the most durable rock type available. The OEF strategy recognises the failures of past practices using “simple” rock engineered “drains” without due recognition of the additional erosion forces on steep slopes that should require engineered “chutes” which are based on more advanced engineering principles. Specific design measures such as bedding layers and geofabric under the rock chutes will be considered to protect the underlying substrate from erosive forces of flows down the chutes.

EPA is concerned that the NAF sediment pond capacity could be significantly reduced over time due to sedimentation and that run-off water could be contaminated from the waste rock material. It has asked for more information on a program of monitoring and maintenance to minimise the risks.

As discussed in the draft EIS, the only contaminant in the NAF runoff will be sediment. Hence the runoff will flow through the NAF sediment pond before being discharged. The NAF sediment pond will be inspected monthly during the wet season for sediment deposition. Once the sediment occupies 10% of the pond volume it will be removed and placed back on the OEF.

EPA has asked why are ‘grasses’ specified for the top and berms of the OEF. Are there any problems anticipated with deeper-rooted vegetation and what are the implications of the low permeability layer for revegetation? Indicate how the PAF material will be protected in the long term from penetration by deep-rooted species. Include information on how this might be monitored.

A mixture of grasses, shrubs and trees will be used in the revegetation of the OEF. Because the minimum cover of NAF material overlying the PAF cell will be 20 m there will be no risk to its integrity from tree roots. The minimum 20 m cover will provide long-term protection to the PAF cell. The integrity of the PAF cell will be monitored by analysis of the water collecting in the PAF pond.

DPIFM notes that geotechnical risk is considered to be the primary risk post closure and asks that systemic geochemical risks such as negative trending water quality should also be considered as high risk with ongoing consideration in all design and closure strategies recommended.

The section of the draft EIS referred to by DPIFM states that “The primary post-closure risk for the mine site is unstable contaminated areas that may lead to significant off-site impacts, particularly from tailings or overburden disposal of contaminated hardstand areas”. Thus geochemical risks such as negative

trending water quality is considered to be a high risk by MRM and detailed consideration in design and closure strategies will be given to this issue.

DPIFM has asked that the closure plan for the site needs to ensure runoff and seepage from the OEF meet recognised guidelines at the point of expression/collection.

The closure plan will include a criterion that runoff and seepage from the OEF will meet recognised guidelines at the point of expression/collection.

With respect to the flooding of the final void, DPIFM has asked if the water enters and exits from the same breach in the bund wall or if there is a discreet entrance and exit point.

There will be a number of breach points in the flood protection bund - at least one upstream as an entrance point and one downstream as an exit point.

DPIFM has asked that livestock drinking water quality should be the target for final pit water quality.

As discussed in the draft EIS, the natural mineralisation of the McArthur River area results in the ANZECC guidelines being not appropriate to assess water quality effects from the mine. Consequently, MRM is currently working with the EPA to agree on site-specific trigger values for water quality in the McArthur River. It is proposed that these trigger values be the most appropriate criteria to use as the target for the final pit water quality.

DNRETA has asked what will be the impact of breaching the flood protection bund after mine closure on the flooding regime.

The flood protection bund will not affect the flooding regime in terms of seasonality and frequency of floods and breaching it at mine closure will have no impact. However breaching it will result in a reduction in the peak flood heights for those floods that break the river banks and flow out into the flood plain (generally greater the 1 in 5 year events). Flood heights could be expected to reduce but not to the extent that they would return to their pre-mine levels.

DNRETA is concerned about the quality of any water that may flow out of the flooded pit following mine closure particularly with the contamination of the water by seepage from the tailings dam.

The predicted quality of the water in the final void (including the effects of the seepage from the TSF) is given in Section 20.3.7 of the draft EIS. This shows that there will be little difference between the water quality in the pit and in the river. The only time that pit water will flow into the river will be during large flood events when high levels of flushing and dilution will be available. Consequently it is not expected that any outflow from the pit will have a deleterious effect on downstream water quality.

DHCS has asked that where possible, large growing native trees should be planted around the open pit void, as large trees create a shading effect that discourages margin vegetation growth, in turn

discouraging mosquito breeding. The open pit void should be stocked with fish as soon as it begins to fill with water.

The area around the pit that has been disturbed by mining will be revegetated with a mixture of grass, shrubs and trees. Trees will be included around the margin of the final void to assist in stabilising the area and in discouraging vegetation growth on the pit walls. It is expected that the pit will naturally contain fish as it is filled by flood waters but consideration will be given to artificially stocking it with fish as well.

AFANT's principal concerns about mine closure can be satisfied if any contaminants are contained in a stable condition on the site in perpetuity and there is no off-site run off or escape of potentially polluting materials.

The site's closure criteria will include the requirements that any contaminants are contained in a stable condition on the site and there is no off-site runoff of potentially polluting materials.

AFANT has stated that any risk of polluted material running down the river the first time the decommissioned pit fills and overflows should be eliminated.

As discussed in Section 20.3.7 of the draft EIS, modelling of the decommissioned pit has shown that its water quality will be similar to that of the existing river water quality. Should the pit overflow it would do so in a major flood event at which time the significant dilution available and the similarity of the water quality would ensure that there would be no deleterious effects from the pit overflow on the river.

ECNT considers that MRM's preferred option - Rehabilitation Scenario 4 - namely to maintain the McArthur River in the new river channel but breach the flood bund wall constitutes irresponsible environmental management. It considers that the open cut project will leave a very long-term scar on the landscape, which will require long-term, and potentially expensive, management and monitoring.

A detailed assessment of the options available for the final void has been given in the draft EIS. This assessment has shown that of all the options considered for management of the final void, the preferred option of breaching the flood protection bund and allowing the pit to fill with flood water has the best environmental outcome. It is predicted that the quality of the water in the final void will be similar to that of the McArthur River and hence, even if there is outflow from the pit in a major flood event, there will be no significant deterioration of downstream water quality. This is considered to represent responsible environmental management.

ECNT notes that the mass balance modelling of water quality in the final pit void does not simulate any chemical reactions or changes that may occur and that there is no discussion about the reliability of the results.

The assessment in the draft EIS of the water quality of the final void included both a mass balance model and a geochemical equilibrium model. The geochemical equilibrium model was undertaken to assess the

effect of chemical reactions that may take place when water from different sources (ie. river water, rain water, pitwall leachate, groundwater, TSF seepage) is mixed in the final void. The results of this model supported the conclusion of the mass balance model that breaching the flood protection bund and allowing the pit to fill with flood water is the preferred option.

The modelling results are as reliable as can be reasonably expected at the design stage of the project. The reliability of the results will be improved by reassessing pit water quality models during the operational period of the open cut project when more specific information is available on relevant input data such as the quality of the pitwall leachate and TSF seepage, and the extent of exposed PAF materials on the pit walls.

ECNT has asked how quickly will the sediment ponds at the OEF fill with sediment and where will the water go.

The sediment ponds at the OEF will not be allowed to fill with sediment. The sediment ponds will be inspected monthly during the wet season for sediment deposition. Once the sediment occupies 10% of the pond volume it will be removed and placed back on the OEF. Water from the PAF pond will be discharged to the water management dam at the TSF. Water from the NAF sediment ponds will flow to the natural drainage system.

ECNT has asked where will the site runoff pond at Bing Bong discharge to and what are the likely effects.

The site runoff pond has been at Bing Bong since operations began in 1995. Operations at Bing Bong will not change as a result of the open cut project and the pond will continue to discharge to land as it always has. Contaminated sediment contained in site runoff is retained in this pond prior to any runoff being discharged. Monitoring at Bing Bong has not detected any significant environmental impacts from the overflow from the site runoff pond.

Operations at Bing Bong will not change as a result of the open cut project. The depth of the Bing Bong site runoff pond is sufficient to allow sediment to be captured to prevent this material from flowing off site. Sprinklers have been installed around the pond to increase evaporation of water. This ensures that maximum volume is available in the event of a storm.

ECNT has noted that the goal for rehabilitation is to return all disturbed areas to stable landforms to minimise off-site deleterious effects and notes that it is not proposed to rehabilitate tailings, the overburden dump and contaminated hardstand areas to resemble surrounding areas.

It is not necessary to rehabilitate the areas nominated by ECNT to resemble surrounding areas to achieve the nominated rehabilitation goals. If it was required to rehabilitate the TSF and OEF to resemble surrounding area it would be necessary to spread the tailings and overburden over a much larger area to recreate the flat to undulating areas surrounding the site. This would not only destroy the progressive rehabilitation that will be undertaken during the mining operation but it would also spread these potentially contaminating materials over a much larger area in a way that could potentially induce acidic

runoff. The proposed rehabilitation goal of containing and stabilising the materials will result in a better long-term environmental outcome.

ECNT has commented that it is not clear whether any consultation with Traditional Owners or the wider community has contributed to the proposed rehabilitation objectives.

MRM's rehabilitation objectives have been set out in detail in its Life of Mine Completion Plan which has been reviewed and approved by the Northern Territory Government. This plan outlines options available for post-mining land use as well as the relevant financial requirements. As discussed in the draft EIS, development of the preferred post-mining land use will be undertaken after full consultation with both the community and the Government. This will include both the Traditional Owners and the wider community.

DLGHS has asked for an assessment of the implications of a breaching of the flood protection bund and mitigation process.

Should the flood protection bund be breached during a major flood event, the pit will fill with water. In this event the mine is likely to close.

DLGHS has asked what will be the contamination levels of the water that will fill the pit after closure from natural seepage, flooding and rain.

Table 20.4 in the draft EIS (Scenario 4) provides the estimated quality of water in the final void once it has filled by natural seepage, flooding and rain.

MARA considers that the closure scenarios proposed do not provide satisfactory rehabilitation or containment of the site or provide satisfactory assurance that a lack of maintenance of the site will not continue to impact on this region forever.

The site closure criteria to be agreed between MRM and the NT Government will include requirements to ensure that there is satisfactory rehabilitation and stabilisation (containment) of all potential contamination sources at the site.

The post-closure management and monitoring program will contain a requirement that the management and maintenance of the site will continue for as long as is necessary to ensure that the agreed closure criteria are achieved.

NLC considers that the final void has the potential to become a source of acid discharge, particularly if sulfidic rock remains exposed on the pit walls and continued contact with fresh water does not occur.

The modelling of the final void water quality presented in the draft EIS included an assessment of the extent of PAF rock that is expected to be exposed on the final pit walls. The preferred option of breaching the flood protection bund and allowing the pit to fill with flood waters was selected because it was one of

the options that ensures all of the PAF areas exposed on the pit walls will be underwater all the time due to groundwater inflow and regular filling from flood waters. Because of these control measures, the final void water will not become acidic.

Once mining ceases, groundwater will flow into the pit. The pre-mining groundwater level of approximately 15 m below ground level may not be reached because of evaporation. Modelling of the “no flood” option for the final void as described in Section 20.3.7 of the draft EIS (option 1) shows that the water level will stabilise at about 24 m below ground level. In reality, water levels will generally be higher than this because the void will be regularly filled with flood water once the flood protection bund is breached. As the PAF in the wall of the final void will be below 25 m, all exposed sulfidic rock will remain below the water level in the pit thus precluding its oxidation and the generation of acidic conditions.

20.3.8 Closure Strategy – Bing Bong (4, 7)

It is mentioned that all areas will be drained through the Bing Bong site runoff pond as much as possible. DHCS has asked that once the Bing Bong site has been revegetated and erosion is likely to be minimal, the site runoff pond be filled and appropriately graded to prevent ponding on the filled surface to prevent mosquito breeding.

Once the site has been rehabilitated and monitoring has shown that runoff water is of acceptable quality, there will be no need for the site runoff pond. The final use of the site is yet to be determined. Provided the selected final use of the site does not require the runoff pond, it will be filled to prevent ongoing ponding.

DHCS has asked that upon closure the depression where the shed is located be filled so that it does not become a source of salt marsh mosquitoes.

Once the site has been rehabilitated and monitoring has shown that runoff water is of acceptable quality, the depression where the concentrate storage shed is located will be filled so that it does not become a source of salt marsh mosquitoes.

DCHS has asked that the spoon drain in front of the conveyor area be as shallow and wide as possible to prevent water ponding within the drain, whilst being capable draining upstream areas within at least 3 days.

The spoon drain in front of the conveyor area has been designed to prevent water ponding. It is capable draining upstream areas within at least three days.

ECNT has noted that the site runoff pond will remain as the site catchment and discharge point after closure and have asked where will it be discharged to and what are the likely effects.

As discussed above, once the site has been rehabilitated and monitoring has shown that runoff water is of acceptable quality, there will be no need for the site runoff pond. The final use of the site is yet to be

determined. Provided the selected final use of the site does not require the runoff pond, it will be filled to prevent ongoing ponding. If the pond is retained, the location of its discharge and its likely impacts can be determined only once the subsequent land use is known.

20.3.9 Post Operational Closure Requirements (3, 6, 7)

DNRETA has stated that the timeframe for post-closure monitoring is not specific and has asked that monitoring should only discontinue when water reaches a predetermined level.

The timeframe for post-closure monitoring was deliberately made non-specific because the monitoring will continue until the results show that the agreed closure criteria have been met including that the site is not causing any downstream water quality impacts. The work will cease only by agreement with the Northern Territory Government.

AFANT has asked if MRM is bound to its commitment to the post-closure management of the site by a legal contractual obligation. How will this staffing and any required operational funding be provided if MRM or Xstrata do not exist at that time? Will the environmental bonds be adequate for this purpose?

MRM will be legally bound to its commitments to post-closure management as they will be a condition of any approval it receives for the open cut project. MRM will maintain its post-closure management and monitoring programs until the results show that the agreed closure criteria have been met. This work will not cease until it is agreed with the NT Government.

MRM will provide appropriately qualified environmental and engineering staff and the resources necessary to implement the post-closure program. This will be funded by Xstrata. At the beginning of the open cut project, Xstrata will provide the necessary security bonds to the NT Government so that sufficient money will be available to implement the post-closure program in the event that Xstrata ceases to exist during the post-closure period.

AFANT believes that the long time frame for post-closure site management should be clearly addressed in the final approved plan and that it should include clear statements of responsibility and sources of assured funding that will be available up to 2050 and beyond.

As discussed above, the requirement for MRM to implement a post-closure program will be a condition of any approval received for the open cut project. This program will clearly identify MRM's responsibilities and the agreed closure criteria. Also as part of any approval received will be an agreement between MRM and the NT Government regarding the necessary security bonds.

ECNT have noted that an eight-year monitoring program will be conducted upon mine closure but there will be only a five-year management program (thereafter staffed as necessary).

The draft EIS does not specify the timeframe for the post-closure management program. It indicates what the staffing arrangements will be for the first five years of the program and states that after that time it will continue to be staffed as necessary. Once all management activities have ceased the monitoring

program will continue for a longer period of time to confirm the success of the closure activities. The draft EIS states that the need for ongoing monitoring will be assessed at the end of the eight year period.

AFANT has asked who will be responsible for the management of the TSF seepage which will need to be collected for 30 years or more.

MRM will maintain responsibility for the management of the TSF seepage collection system for as long as is necessary to achieve the agreed closure criteria.

21.0 Biodiversity Offsets (5, 7, 10)

MAGNT has commented that the EIS does not say that MRM would actually put money towards any of the offset projects.

MRM is committed to supporting the biodiversity offsets program financially. The extent of this support and input from other stakeholders will be determined during the implementation process.

ECNT does not support the notion that one area of high conservation value can be sacrificed in order to protect another. It considers that the five options under consideration should be accorded a higher level of protection and conservation management regardless of whether the open cut project proceeds. ECNT considers this to be an issue of responsible biodiversity and land management on the part of McArthur River Station, the NT Government and the broader community, independent of the mine proposal. Conservation objectives are more appropriately pursued as part of the implementation of the NT Parks and Conservation Masterplan.

The objective of biodiversity offsets is not to sacrifice one area for another, but to help compensate for the accepted, inevitable loss of biodiversity caused by development. The offset options are tied to the development approvals and if the mine is not approved, no offsets will be necessary. Any subsequent change in the conservation status of areas on the pastoral lease would be unrelated to this EIS.

DEH has stated that it supports the development of offset initiatives (in relation to the upper McArthur River and Port McArthur Wetlands) within the context of the environmental management plan.

This support is noted.

21.4 Implementation Process – Biodiversity (3, 13)

DNRETA considers that the suggestion that only one of the biodiversity options may be pursued should be reconsidered.

No decision has yet been made on which or how many biodiversity options will be adopted. This will be subject to discussion and agreement between the stakeholders during the implementation process.

NLC considers that the EIS is unclear as to how the biodiversity offsets will be delivered or what is needed to bring them to fruition. It suggests that further details be provided before it is possible to begin to understand what might be achievable for both biodiversity and for resource users.

Further details on how the biodiversity offsets program is to be implemented will be developed once there has been discussion with and input from all of the stakeholders involved. This will include options for how the offsets will be delivered and what is needed to bring them to fruition.

22.1.3 Environmental Impact Management (5)

MAGNT has stated that the principal government agency responsible for oversight (NRETA) of the project should ensure that these reports (annual reports) are publicly accessible on its website to ensure the kind of transparency and accountability that is expected.

MRM supports this proposal.

22.3 Construction Environmental Management Plan (4)

DHCS requests the opportunity to view and make comment on the Management Plans as they are released by the proponent. DIPE shall liaise with DHCS to formalise a protocol for viewing these documents, as they are made available.

MRM supports this proposal.

22.3.1 Waste Management Plan (4)

DHCS has requested that the Waste Management Plan complies with the NT Public Health Act and Regulations.

MRM will ensure that the Waste Management Plan complies with the NT Public Health Act and Regulations.

22.3.2 Air Quality Management Plan (1)

EPA considers that the air quality management plan for construction is vague and that the target should include quantitative limits rather than referring to environmental nuisance. It also states that reporting from the construction phase will also need to be included in the NPI.

Setting quantitative limits for construction dust performance is difficult due to the highly variable nature of dust emissions in remote locations. Nevertheless, MRM is aiming to meet the NSW EPA criterion for deposited dust of 4 g/m²/month during construction at the existing monitoring sites. The NSW EPA PM₁₀ targets of 50 µg/m³ (24-hour average) and 30 µg/m³ (annual average) will be the performance targets for particulate concentration as measured by the high-volume sampler to be installed at the eastern side of the mine camp. Construction emissions will be included in the NPI reporting for the site.

22.3.8 Incidents and Complaints (4)

DHCS requests further details on the community complaints mechanism that will be available during the construction phase.

A copy of MRM's procedure and form for community complaints is given in Appendix I. Note that this is a draft that is currently being reviewed.

22.4 Operations Management Plan (4, 13)

DHCS requests the opportunity to view and make comment on the Management Plans as they are released by the proponent. DHCS is particularly interested in the Management Plans for Waste Management, Air Quality, Groundwater, Social and Community Impact and Rehabilitation. DIPE will liaise with DHCS to formalise a protocol for viewing these documents, as they are made available.

MRM supports this proposal.

NLC has requested that development consent be withheld until appropriate programmes and strategies have been designed, agreed to between all stakeholders and implemented as part of the EMP.

It is expected that development consent will not be given by the NT Government until it is satisfied with the environmental management program as set out in the EIS or as subsequently amended and agreed.

22.4.1 Waste Management Plan (4)

DHCS has requested further information on the monitoring process especially in relation to the surveying of the overburden emplacement facilities and the monitoring of ground and surface water in the vicinity of the overburden emplacement and the tailings storage facilities.

Details of the management and monitoring programs for the surface water and groundwater are given in Sections 22.4.4 and 22.4.5 of the draft EIS.

DHCS requests details on how frequently monitoring will occur and the personnel who will be responsible for the monitoring process.

Surface water and groundwater will be monitored monthly by trained environmental officers. Results will be reported in MRM's annual monitoring reports.

DHCS has stated that the Waste Management Plan must comply with the NT Public Health Act and Regulations.

The operations phase Waste Management Plan will comply with the NT *Public Health Act* and Regulations

22.4.2 Air Quality Management Plan (1, 4)

EPA has stated that the air quality management plan for ongoing operations needs to specify the locations, methods and timing of monitoring programs. Reporting also must be provided to the NPI annually.

MRM currently maintains dust deposition monitors at locations marked as D1 – D24 in Figure 8.2 of the draft EIS. The existing dust deposition monitoring program will continue and will be reviewed prior to

the commencement of the open cut operations to determine appropriate monitoring locations in light of the proposed changes to site activities. The dust collected will continue to be analysed for lead and zinc concentrations according to the current sampling protocol. Dust deposition is carried out according to AS/NZS 3580.10.1:2003 : *Methods for sampling and analysis of ambient air - Determination of particulate matter - Deposited matter - Gravimetric method*. Deposition samples will be collected every two months, similar to the existing program.

A high-volume sampler (HiVol) will be installed at the eastern side of the mine camp to monitor for ambient concentrations of suspended particulates. The monitoring will be undertaken in accordance with Australian Standards AS/NZS 3580.9.6:2003, AS/NZS 3580.10.1:2003 or AS3580.9.7:1990. The filters collected from the monitor will be analysed for lead and zinc content to provide suitable data on emissions. AS/NZS 2800-2005 refers to the method used to analyse the HiVol filter paper for lead and this will be adhered to (if scientifically appropriate given the limitations expressed in the standard) for lead analysis. This will measure particulate concentration on a six-day cycle.

Monitoring of wind speed, wind direction, rainfall and temperature will continue to be undertaken at the airfield. The anemometer will be regularly calibrated and maintained to ensure acceptable data quality.

Dust emissions will be included in the annual NPI report for the site.

DHCS has requested further details on the air quality monitoring process including how frequently monitoring will occur and the personnel who will be responsible for the monitoring process.

See above for additional details. Monitoring will be undertaken by trained environmental officers.

22.4.4 Surface Water Monitoring Plan (6, 7, 9)

AFANT believes that a specific monitoring program should be put in place for the river realignment and those of Barney and Surprise Creeks. It has asked that the monitoring program should operate during the construction phase to ensure that there are no impediments to fish migration in the new channels and that the channels are constructed to be as fish friendly as possible.

The new channel will not be commissioned until it is confirmed by inspection by a fish biologist that no barriers to fish migration are present. After commissioning, MRM will undertake biological monitoring (including factors important for fish migration) and the monitoring programme will be more detailed in the first two wet seasons of operation. After that time the effectiveness of the monitoring program will be reviewed and modified if necessary.

AFANT notes the proposed water monitoring regime but believes that the importance of the McArthur River as a recreational fishery requires more of a whole-of-river approach. It considers that by assessing water quality throughout the river rather than just around the mine site, MRM will be able to better assess the effectiveness of a major part of its environmental management program and report on the success of its program in maintaining water quality throughout the river.

Beyond the impacts of the mine (which will be very extensively mitigated and localised), there are a wide range of land-use and hydrology factors that could impact on the recreational fishery values of the McArthur River. Managing impacts on recreational fishery values is therefore the responsibility of all catchment landholders, land-users, and stakeholders. As a stakeholder and land holder within the McArthur River catchment, MRM will contribute to its share of responsibility for managing impacts on fishery values and contribute to the facilitation of catchment wide management strategies. The involvement of the recreational fishing industry and peak organisation will be beneficial to this environmental management process.

Nevertheless, MRM commissioned Charles Darwin University in 2003 to survey the heavy metal status of sediments and biota at the mouth of the McArthur River. In addition, MRM has committed to further sampling and analysis for heavy metals in the McArthur River from Borroloola to the river mouth on an annual basis. Sampling points utilised in the 2003 study would again be used in addition to transects across the delta of the mouth of the McArthur River. If the sampling within the river and the additional transects show no impact over two years after the open cut operations begin, the transect sampling will cease and will focus on the river.

ECNT has asked for further details on the plan to pump water to the TSF from the underground void storage should a level of 2100ML be reached and to then upgrade the water management system at a trigger value of 2300ML.

The underground void storage capacity is planned to be 3,500ML for years 1 to 12, and 2,500ML for years 13 to 25. The nominated 2,300 ML storage trigger level for implementation of works to upgrade water management system storage capacity is from OPSIM modelling for a range of climatic scenarios (as credibly evidenced from historical data) such that there is sufficient lead time (1 to 2 years with greater than 90% confidence) to implement upgrade works. The 2,100ML trigger level for pumping to the TSF is also based on OPSIM modelling which has shown that this level will result in less than 50% chance that the void storage would fill within 17 years. The respective trigger levels are not directly related to the same water management issue and do not pose a water management risk.

As part of more detailed performance monitoring obtained in the early years of operation, MRM will undertake additional OPSIM modelling with the benefit of actual (rather than estimated) groundwater inflow data to reassess the appropriateness of respective trigger levels and revise these if necessary. Any proposed changes to the trigger levels will be agreed with the EPA.

DLGHS has raised concerns that MRM does not monitor metals and other minerals in freshwater aquatic life.

MRM commissioned Charles Darwin University in 2003 to survey the heavy metal status of sediments and biota at the mouth of the McArthur River and found that:

- Metal levels in sediments were similar to other river estuaries in the south eastern Gulf. Lead isotope data indicate that MRM ore-derived lead does not contribute to the lead inventory of these sediments.

-
- Lead isotope ratios in sea grass indicate that MRM ore-derived lead makes little or no contribution to lead levels in sea grass.
 - Metal concentrations in oysters are all well below food standards (AFS A12). Lead concentrations in oysters were too low to determine lead isotope ratios.

In addition MRM has committed to further sampling and analysis for heavy metals in the McArthur River from Borroloola to the river mouth on an annual basis. Sampling points utilised in the 2003 study would again be used in addition to a transect across the delta of the mouth of the McArthur River which would extend in three parallel lines out to Port McArthur. If the sampling within the river and the additional transects show no impact over two years after the open cut operations begin, the transect sampling will cease and will focus on the river.

22.4.5 Groundwater Management Plan (4)

DHCS has requested further details on the monitoring process including how frequently monitoring will occur and the personnel who will be responsible for the monitoring process.

MRM currently monitors 27 bores for depth and water quality on a monthly basis. Additional regional bores are also monitored at least once a year. The parameters that are analysed from these bores each month include As, B, Ba, Cd, Cu, Ni, Pb, Sb, Se, Ti and Zn. Monitoring is undertaken by environmental staff who have been trained internally.

22.4.6 Biology (3, 6)

DNRETA has asked for the inclusion of a requirement on vehicle and machinery hygiene to ensure that all vehicles/machinery are clean of all weed seed and soil when moving into and out of the project area.

All construction vehicles will be washed upon entering and leaving the site to ensure that they are clean of weeds.

AFANT has stated that the biological monitoring program in the Environmental Management Plan needs to be strengthened, particularly for the monitoring of aquatic organisms and fish.

In addition MRM has committed to further sampling and analysis for heavy metals in the McArthur River from Borroloola to the river mouth on an annual basis. Sampling points utilised in the 2003 study would again be used in addition to a transect across the delta of the mouth of the McArthur River which would extend in three parallel lines out to Port McArthur. If the sampling within the river and the additional transects show no impact over two years after the open cut operations begin, the transect sampling will cease and will focus on the river.

AFANT has asked that MRM considers producing public information materials detailing plans for the river realignment works, showing how the movement of fish and other aquatic organisms has been taken into account and setting out the processes for monitoring the operations to ensure that fish are not being adversely affected.

MRM will consult with all relevant members of the community throughout the project to ensure they are fully informed.

AFANT considers that because of the particular importance of recreational fishing to the region, MRM should have in place a monitoring process with a particular focus on the McArthur River and its recreational fishery.

Beyond the impacts of the mine there are numerous land use and hydrology factors that impact on the recreational fishery values of the McArthur River. Managing impacts on recreational fishery values is the responsibility of all catchment landholders, land users, and stakeholders. As a stakeholder within the McArthur River catchment, MRM will contribute to managing impacts on fishery values and catchment-wide management strategies. The involvement of the recreational fishing industry and peak organisation will be beneficial to this environmental management process.

22.4.7 Mosquito Management Plan (4)

DHCS requests further details on the monitoring process including how frequently monitoring will occur and the personnel who will be responsible for the monitoring process.

MRM will monitor the mosquito activity within the accommodation and work areas to identify the success of mitigation measures and to determine whether larval and adult eradication programs should be implemented.

Elements of the monitoring plan to be discussed with the Medical Entomology Branch of DHCS will include the following:

- Adult, larval and exotic mosquito monitoring.
- Larval mosquito monitoring to be conducted throughout the year at selected locations (eg. water ponds, drains, overflow areas, at selected points in the cut off sections of McArthur River, at selected points in the diverted sections of the McArthur River and at Bing Bong Port spoil disposal area).
- Adult mosquito monitoring to be conducted monthly during the dry season and fortnightly during the wet season, at three sites at the McArthur River Mine and one site at Bing Bong Port..
- Ovitrap monitoring (monitoring for exotic dengue carrying mosquito species) to be conducted at three sites at the McArthur River Mine and three sites at Bing Bong Port.

22.4.8 Cultural Heritage Management Plan (4)

DHCS requests further details on the monitoring process including how frequently monitoring will occur and the personnel who will be responsible for the monitoring process.

One of the recommended monitoring activities set out in the cultural heritage management plan in the draft EIS is a predictive archaeological survey. This survey has been undertaken and the survey report is given in Appendix J.

The survey found that there are 3 archaeological sites and 42 background scatters of stone artefacts that will be disturbed by the open cut project. The three archaeological sites (MRM 1, MRM 2 and MRM 4) were assessed as having moderate to high archaeological significance. The survey's recommendations are summarised below.

Site	Location	Recommendation Action
MRM1	Open Cut	Detailed surface recording including a collection of artefacts
MRM 2	Open Cut	Detailed surface recording including a sample collection of artefacts and a test pit excavation of the site
MRM 3	OEF	Detailed surface recording including a sample collection of artefacts and a test pit excavation of the site
Background Scatters		No further action

The survey report recommends that following excavation and recording, permission to destroy be sought from the Minister for Environment and Heritage.

The survey report also indicates that all background scatters found were of low archaeological significance and as such permission to destroy should be sought.

The survey report concludes that there is a low potential that any significant archaeological material has remained unidentified, and therefore recommends that no further archaeological assessments are required.

On the basis of these findings, once the recommendations actions has taken place, no further cultural archaeological monitoring will be required.

22.4.9 Social and Community Management Plan (4, 7)

DHCS requests further information on the community complaints mechanism.

A copy of MRM's procedure and form for community complaints is given in Appendix I. Note that this is a draft that is currently being reviewed.

DHCS has asked for further details on the training and employment opportunities that will be made available to the local indigenous community.

MRM's position is that it does not have 'jobs for local regional residents', it simply has vacancies for which local community members are welcome to apply. All applicants are judged on their skills and attitude and as per workplace health and safety regulation, are required to comply with drug and alcohol tests.

Nevertheless, MRM operates an entry level traineeship program for unskilled employees. Since 1995, 106 local Aboriginal people have been employed in this program through which unskilled employees received the training necessary to qualify for progression into skilled positions. Furthermore, 80 local indigenous people have been employed by the related Carpentaria Shipping Services operation.

Under the traineeship program, 10 positions are available annually for unskilled local residents with no employment experience. The objective is to encourage employment and provide skills training to build people's confidence and ability to secure skilled jobs.

The operational and training plans for the proposed open cut mine are targeting a significant increase in the number of opportunities available for local indigenous people. The number of traineeships will be increased from 10 to 20 per year. In addition, a target of 20 percent of the workforce has been set for indigenous participation.

ECNT has stated that there has been an inadequate level of social impact assessment conducted and detail provided about future actions.

The social impact assessment undertaken has been detailed in the draft EIS. Social impacts that have been assessed have included those relating to workforce and employment, accommodation, education, health, recreation and tourism and visual amenity. Where necessary management strategies have been proposed to mitigate any negative impacts.

MRM has worked extensively since operations began to minimise social impacts within the local community. Under the ownership of Xstrata Plc, MRM upholds business principles which recognise the importance of community social involvement. The objective is to make a positive, long term impact on the communities in which the company operates or has an influence.

Under this policy, MRM is currently investigating the establishment of a community social involvement program targeting initiatives in the areas of:

- enterprise and job creation
- environment
- education
- social/community development
- health
- culture/art

Even before the acquisition by Xstrata of MRM's former owner, MIM Holdings, the mine was investing money or time or providing contra support in these areas. Details of this investment have been outlined in the responses given in this EIS Supplement to comments made about Section 2.2 Project Need.

These actions have assisted in mitigating social impacts in the community and in improving the quality of life for local residents. If the proposed open cut development is approved, then MRM has the benefit of an additional 25 year mine life in which to plan its commitment to the community.

It is for this reason that considerable research has been undertaken into the needs and issues of the community with the view to establishing a Community Partnership Program. This will supplement ongoing sponsorships and partnerships and ensure a positive legacy by MRM in the region.

22.4.11 Rehabilitation Management (1, 7)

EPA has raised doubt that the proposed seeding rate of 2-5 kg/ha will be adequate for rehabilitation of a mixture of woody, herbaceous and grass species are used and if seed viability is taken into account.

An outline of the proposed channel revegetation program is given in Section 13.2.2 of the draft EIS and further details are provided in Appendix K which contains a report prepared by Top End Seeds a specialist revegetation and rehabilitation company. This report provides further details on the:

- Criteria for species selection;
- Basis for species mix;
- Estimated duration and time for harvesting and seeding; and
- Methods of seeding and planting.

Top End Seeds suggests that generally direct seeding requires a large volume of seeds with application rates of 2.5 to 5 kg/ha. Target species should be those whose seeds can be collected at such rates.

Ideally the proportion of seed for each species should replicate the proportions in which they naturally occur. The final seed mix will be dependant on what species can be collected in adequate quantities. Also the final landform will have an influence on the specific amounts of each species to be used on different areas. For example, if the ground in a particular area is rocky and freer draining, less *Melaleuca* species and more *Eucalyptus/Corymbia* species will be used.

A total of 35 hectares is to be rehabilitated in the wet season of 2006-07, with another 25 hectares in the wet season of 2007-08. As the site is subject to water inundation and is likely to be prone to erosion it is proposed that a fairly high seeding rate be used.

The tree and shrub seed will be applied at a rate of 4 kg per hectare. A total of 140.kg will be required for the 2006-07 wet-season and a further 100.kg for 2007-08.

The grass (including herb and forb) seed will be applied at a rate of 10 kg per hectare, with a total of 350 kg required for the 2006-07 wet season and 250 kg for 2007-08.

On this basis the anticipated quantities of seed collection for 2006/07 and 2007/08 are given in the following table.

Species	Amount for 06/07	Amount for 07/08
Acacia drepanocarpa	0.5 kg	0.5 kg
Acacia hemsleyi	6 kg	4 kg
Acacia holosericea	2 kg	1.5 kg
Acacia platycarpa	6 kg	4 kg
Atalaya hemiglauca	3 kg	2 kg
Casuarina cunninghamii	30kg	20 kg
Corymbia bella	15 kg	11 kg
Eucalyptus camaldulensis	23 kg	17 kg
Eucalyptus microtheca	8 kg	6 kg
Hibiscus panduriformis	2 kg	2 kg
Lophostemon grandiflorus	1 kg	1 kg
Melaleuca argentea	23 kg	16 kg
Melaleuca leucadendra	15.5 kg	10 kg
Terminalia platyphylla	2.5 kg	2.5 kg
Terminalia volucris	2.5 kg	2.5 kg

ECNT has asked who will be responsible for the long-term operation of interception bores at the toe of the TSF.

MRM will continue to be responsible for the operation of the TSF seepage management system until the agreed closure criteria have been met.

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