A search of the Northern Territory Heritage Register was conducted for the Pine Creek 1:250 000 map sheet. No registered historical or archaeological sites were recorded on the database in the Frances Creek area (MBS Environmental, 2006a).

The Aboriginal Areas Protection Authority (AAPA) has a record of an Aboriginal site within AN 389. This is outside the proposed mining areas.

Mr Tim Hill, accompanied by Bessie Coleman, completed an Aboriginal sites survey of the Frances Creek project area between 17 and 21 October 2005 (Appendix 10 of the PER). A total of eight Aboriginal archaeological sites were recorded during the survey. These sites are considered to have low to moderate significance due to the extent of existing disturbance and presence of a relatively intact site complex at Mt Porter, approximately 5 km to the south-west (Hill, 2005 as cited in MBS Environmental, 2006a).

The proponent is in the process of obtaining an AAPA Authority Certificate for the Frances Creek Project.

4 Environmental Impact Assessment

4.1 Introduction

The purpose of this Assessment Report is to evaluate the environmental protection measures of the project proposal. This is done by identifying all potential environmental impacts and evaluating the corresponding safeguards or prevention measures suggested by the proponent. Where the proposed safeguards are considered insufficient, or where a safeguard is significantly important, recommendations are made in this Report to complete or emphasise those commitments made by the proponent.

The environmental acceptability of this project is based on consideration of the following from the PER and Supplement:

- Adequacy of information outlining the proposal (particularly which structures or activities are likely to impact the environment);
- Adequacy of information on the existing environment (particularly environmental sensitivities);
- Adequacy of information on the range and extent of potential impacts; and
- Adequacy of the proposed safeguards to avoid or mitigate potential impacts.

The EPA Program considers that the environmental issues associated with the Frances Creek Project have been adequately identified. Appropriate environmental management of some of the issues has been resolved through the assessment process, while the remainder will be addressed through monitoring and management actions detailed in issue-based management plans, included as part of the Mining Management Plan (MMP).

Acceptable environmental outcomes for this project are dependent on the proponent completing and refining the issue-based management plans in consultation with relevant stakeholders and with regular reporting and compliance auditing to the satisfaction of the NT Government. Acceptable environmental outcomes depend on

the proponents implementing all commitments identified in the PER and Supplement (Appendix 1 of this document) as well as those presented in this Assessment Report.

Subject to decisions that permit the project to proceed, the primary recommendations of this assessment are:

Recommendation 1
The proponent shall ensure that the proposal is implemented in accordance with the environmental commitments and safeguards identified in the Frances Creek Project, Public Environmental Report and Supplement to the Public Environmental Report and recommended in this Assessment Report (No. 57).

All safeguards and mitigation measures outlined in the Public Environmental Report and Supplement are considered commitments by Territory Iron Limited and are included in Appendix 1 of this report.

Recommendation 2
In accordance with clause 14A of the Administrative Procedures of the Environmental Assessment Act, the proponent shall advise the Minister of any changes to the proposal for determination of whether or not further environmental impact assessment is required.

The environmental issues associated with the proposal are:

1. The characterisation, prevention and management of acid rock drainage (ARD) from waste rock material.
2. Water management in a wet-dry tropical environment.
3. Placement of waste rock stockpiles and overburden.
4. Management of detectable levels of uranium, thorium and radon gas.
5. Management of social impacts.
6. Rehabilitation, in particular the Thelma 2 pit and waste rock stockpile; mine closure and post mine monitoring.

The remainder of Section 4 deals with issues raised in the submissions to the PER and the proponent's commitments to environmental management provided within the PER and Supplement. In addition, recommendations to strengthen environmental management strategies and safeguards are presented. Some issues were adequately addressed in the Supplement and require no further discussion. The outstanding environmental issues that remain are discussed below.

4.2 Geochemical Characterisation

Geochemical characterisation is necessary to determine whether leachate from waste rock, tailings or ore is likely to contain environmentally unacceptable concentrations of major ion solutes and metal irrespective of whether it is acidic or not (Northern Territory Minerals Council et al, 2004). Predictions of the geochemical properties of the various materials to be mined should be undertaken before the commencement of a project in order to anticipate environmental impacts of the operation.

4.2.1 Results from Historic Mining Activities

Territory Iron Limited investigated the water quality in existing pits. Samples from pit water were analysed by Australian Groundwater Technologies (AGT). The full physiochemical analyses of pit water quality can be found in the Frances Creek Project PER Volume 2 (Appendix B of Appendix 5). The results showed that one of the six historic pit lakes is acidic, Thelma 2. Geochemical investigations conducted by AGT determined that the cause for this represents the sum of organic and sulfhuric acid development, which has then been concentrated by 32 years of evaporation since former mining. The proponent has presented management and mitigation measures to ensure generation of acid as a result of future mining activities is prevented (see Commitment S6).

4.2.2 Projected Characterisation

Territory Iron Limited states that the iron ore deposits are effectively free of sulfur and toxicants, but enclosing carbonaceous waste rocks contain trace amounts of uranium and chalcophile element – bearing sulphides. According to MBS Environmental, sulfur contents are very low (maximum value recorded in ore is 0.025%, and in waste 0.103%) and the proponent considers the chance of acid development at these levels would normally be considered zero. MBS Environmental report that the only location where any problem with acidity has been sighted, is at the Thelma 2 Pit area where no further mining is proposed. Thelma 2 is further discussed in Sections 4.2.3 and 4.2.4.

Territory Iron Limited have stated in the event that fresh black siltstone rock is encountered during mining, Territory Iron Limited will conduct further testing of this material and encapsulate it with inert waste rock in the waste rock stockpiles where required. (**Commitment S6**)(MBS Environmental, 2006b).

4.2.3 Waste Rock Characterisation

Ten waste rock samples were taken for geochemical characterisation. As presented by MBS Environmental, none of the samples were characterised as acid forming - all sample were classified as Non Acid Forming (NAF).

The sampling covered the Ochre Hill, Helene 5, Helen 6/7, Jasmine East, Thelma Pit 2 and Thelma Rosemary deposits. Eight composite samples were taken from reverse circulation drill chips, one from open pit waste and one from cretaceous overburden.

The sampled waste rock predominantly comprises oxidised siltstone and shales, with some dolerite as well as cretaceous sediments. All samples were analysed for Acid Neutralising Capacity, sulfur by LECO and sulphate-sulfur. Since no LECO sulfur analyses exceeded 0.2% total sulfur, none were analysed for Net Acid Generation (MBS Environmental, 2006b).

As part of geochemical characterisation studies, MBS Environmental determined the potential for trace element pollution of local ground waters from long-term waste rock disposal and the interaction of groundwater with final pits. This was achieved by undertaking leachate testing. Waste rock samples were leached with 1.0 molar acid to test for weak acid soluble metals. Six samples of surface soils and 11 waste rock samples were also water leached for comparative soluble metals data. Review of the results by MBS Environmental indicates that:

- Helene and Ochre Hill areas will produce alkaline waste rock with negligible toxicants;
- Traces of arsenic, cadmium, nickel and molybdenum may leach from Ochre Hill waste rock, but only very slight dilution plus oxygenation will be needed to reduce concentrations for all of these elements to below ANZECC fresh water trigger values; and
- In the Jasmine–Thelma-Rosemary area, small amounts of cobalt, copper, lead, nickel, thallium and zinc are likely to leach from waste rock over time, but as for the Ochre Hill area, only slight dilution plus oxygenation will be needed to reduce all leachate results to below ANZECC fresh water ecosystem protection trigger values.

DPIFM has recommended that a pH of less than 5 should be considered problematic and worthy of appropriate management strategies. Any material likely to add to Acid Rock Drainage (ARD) problems in the smallest positive increment should be identified and managed. It should also be noted that mobility of metallic toxicants related to pH are not restricted to available sulfur and non-acid solutes also require monitoring and management with respect to total metal toxicant loadings on downstream aquatic ecosystems.

Recommendation 3
Waste rock characterisation, together with multi-element data and kinetic testing is to occur over the life of the mine. Should additional test work determine significant variations from those described in the PER and Supplement, the proponent will revise waste rock management strategies to ensure appropriate ARD management strategies are adopted.

4.2.4 Existing Pit Void - Thelma 2

The condition of the existing Thelma 2 Pit void and remnant waste rock stockpile raised concerns during the assessment process. These two historic features are problematic and require special attention due to the chemical characteristics of pit water and waste rock. The pit water is mildly acidic while the waste rock stockpile remains devoid of vegetation after 32 years.

The water present in the Thelma 2 Pit is pH 3.5 and is blue in colour. The source of acidity in the pit should be investigated and managed to prevent further acidification of waters in the pit. Elevated metals with respect to 95% species protection for slightly to moderately disturbed ecosystems include aluminium, beryllium, cobalt, (chromium may need further investigation) copper, nickel and zinc. Magnesium and calcium ratios should be investigated to examine potential magnesium toxicity.

This indicates a requirement for treatment if there is to be any discharge from Thelma 2. The PER and the Supplement have provided insufficient information to indicate a discharge can be managed. Accordingly, it is the EPA Program's preference that there be no discharge from Thelma 2. However, if a discharge is required a Waste Discharge Licence will need to be obtained and the proponent would need to demonstrate appropriate treatment and risk management systems to maintain appropriate water quality and aquatic ecosystem protection (refer to Recommendation 5).

Territory Iron Limited has advised that no further mining is proposed at the Thelma 2 Pit, however mining will be extended at the Thelma Rosemary Pit which is less than 1 km away. Excess stormwater will be pumped from the Thelma Rosemary Pit to Thelma 2 Pit.

The following mitigation measure is provided by Territory Iron Limited. This would ensure that water remains contained in the pit voids and is of particular relevance to the Thelma 2 Pit:

- Stormwater will only be pumped to these pits as long as there is sufficient freeboard in the pits to contain runoff from a 1 in 100-year average recurrence interval, 72 hour duration rainfall event (**Commitment 8.4.4a**).

DPIFM have commented that all pits except Thelma 2 appear benign in water chemistry and if mining intersects the same problematic ore as encountered at Thelma 2, it may be necessary to treat or isolate this water (refer to recommendation 5 below). Any water discharged from Thelma 2 would require a waste discharge licence due to the levels of contamination reported within the PER. Strategies will also need to be presented for mining and waste encapsulation of new waste to ensure further contamination does not occur (refer to Section 4.4).

4.2.5 Remnant Waste Rock Stockpile – Thelma 2

Rehabilitation of the Thelma 2 waste rock stockpile has not progressed to what would be deemed acceptable by modern mining standards. This is largely due to poor siting of the dump and the lack of rehabilitation measures implemented at the time of placement. Territory Iron Limited intends covering the historic waste rock stockpile with fresh waste rock material from the Thelma Rosemary Pit. The carbonaceous siltstone material in the waste rock which contributes to acidic runoff will be covered by inert rock material from the Thelma Rosemary Pit.

In assessing this proposed remediation, Territory Iron Limited concede that surface drainage will need to be modified so that the stockpile no longer dams water courses, preventing the current leaching of runoff through carbonaceous siltstone waste. Surface slope angles would also need to be reduced, drainage improved and suitable growth medium provided to allow revegetation. Territory Iron Limited expects that the proposed remediation of the Thelma 2 waste rock stockpile will effectively resolve current issues such as the lack of regrowth and acid seepage (Photos 7 and 8 of Appendix 3 of this document). Non-acid solute metal loadings generated from all stockpiles on the mine site must be managed in the context of total metals loadings, stormwater management, and availability of toxicants to the aquatic ecosystem.

Recommendation 4

It is recommended that Territory Iron Limited provide further details of the stockpile design and management of the Thelma Rosemary Pit in the MMP to demonstrate that successful remediation of the Thelma 2 waste rock stockpile can be achieved as this has not been illustrated in Figure A3-4 of Appendix 3 of the PER.

4.3 Water Quality and Management

4.3.1 Water Quality

Mining operations have the potential of impacting on both surface water and groundwater chemistry. Mobilisation of sediment and minerals need to be thoroughly examined and mitigation measures put into place where risks to the water quality have been identified. In determining the potential impacts of the mining operation to water chemistry, geochemical characterisation can provide the necessary data to make assessment on the impacts to the receiving environment.

Sections 8.3 and 8.4 of the PER discuss operational impacts of the proposed mine on groundwater and surface water. Management actions for minimizing impacts on water quality from potential ARD have been provided by Territory Iron Limited. Some of the commitments relating to water quality management are listed below. A full list of commitments is at Appendix 1.

Surface waters around the mining area are of good quality apart from elevated levels of aluminium and iron, due to local mineralisation, and likely previous soil disturbance associated with extraction activity. The declared Beneficial Uses of Water for the Mary River catchment are currently under the categories for environment (protected aquatic ecosystems) and cultural and recreational. EPA Program has assessed the water quality data provided by the proponent, and recommends that based on the current data, and land use, that water quality be managed to achieve 95% species protection levels. Further surface water quality data from the mine site and available reference sites must be obtained prior to any development of a waste discharge licence.

The Mary River below Frances Creek should be managed for 99% species protection levels, in the absence of local water quality data. Water quality objectives (WQO) or targets (WQT) should be set for Frances Creek and the Mary River based on statistically significant site specific water quality monitoring data both in the surface waters and in appropriate reference sites for this area. Ongoing ambient monitoring will be required as part of the waste discharge licence to verify the attainment of WQO/WQT and hence the protection of the appropriate beneficial uses.

A water discharge licence would be needed from NRETA to permit release of water from Frances Creek Dam to Frances Creek, and from pit stormwater sumps to Maude Creek tributaries. Any water releases to the environment would need to meet approved water quality criteria as defined in the discharge license (**Commitment 8.4.3b**). Refer to Recommendation 5 which describes the hierarchical approach to water disposal.

- The water monitoring program is to include analysis of water potentially to be discharged to the environment prior to any such discharge (**Commitment 8.4.5c**).
- The water monitoring program would include regular sampling of water upstream and downstream of all mining activities within the tenements and stockpiling at Roney Siding. Monitoring results would be reviewed regularly against past monitoring and ANZECC guidelines to detect any deterioration in water quality and allow action to be taken (**Commitment 8.4.5d**). Monitoring results would be reported to NRETA in annual environmental reporting.

Territory Iron Limited have committed to implementing surface and groundwater monitoring programs (**Commitments 8.3.2a-e and 8.4.5a-c**). These would occur during all stages of the project and would include post mine closure. If monitoring data detects acidic runoff, an investigation into the cause would be conducted and appropriate management strategies implemented.

Other commitments made by Territory Iron Limited relating to water quality are those for surface water **Commitments 8.4.2a-j and 8.4.3a and c.**

To strengthen the above environmental strategies, the EPA Program recommends:

Recommendation 5
Water entering the surrounding environment from mining operations should be subject to a water management hierarchy approach, including avoidance of discharge, re-use, recycling or treatment before disposal.

Recommendation 6
Monitoring results need be reviewed against ANZECC trigger values for protection of freshwater ecosystems.

Recommendation 7
Drainage from the waste rock stockpiles must be directed to the nearest pit rather than the receiving environment.

4.3.2 Water Balance

Establishing a water balance during the design stage is one of the most important considerations to prevent water management problems occurring during operation and closure. It is essential that the Frances Creek Project is designed to handle and control the required inflows and outflows as well as any unpredictable fluctuations (eg high rainfall events).

Territory Iron Limited has determined that water requirements for the proposed operations will be lower than the previous operations because no wet screening of ore will occur and the site will not have to support a township. The proponent has anticipated that dust suppression and evaporation will consume all available water during the dry season. Excess water is likely to be present during the wet season due to increased rainfall, lower dust suppression water requirements and reduced evaporation.

An analysis of the water balance by MBS Environmental indicates that Helene 11 Dam will likely fill and overflow into Frances Creek Main Dam during the wet season when dust suppression requirements and evaporation are low. At the same time Frances Creek Main Dam will be full and overflowing into Frances Creek.

Discharge of rainwater accumulation from Ochre Hill Pit to the environment will also be needed after heavy rainfall. Rainwater discharge from Ochre Hill Pit will go to a settlement basin and allowed to discharge to the nearby tributary of Maude Creek. Discharges of pit rainwater accumulation will coincide with natural high water levels in the receiving water courses caused by the same rainfall as rainwater accumulation in the pits.

Territory Iron Limited has adequately identified the potential environmental impacts of the mining operation on surface water quality and groundwater/surface water

interactions. The following monitoring and mitigation measures are outlined in the commitments below. A complete list of commitments from the proponent can be found at Appendix 1:

- A water monitoring program will be implemented under the EMP (**Commitment 8.4.5a**).
- Installing groundwater monitoring bores in areas close to the Helene 11 Dam and Helene 5 and 6/7 pits to evaluate changing groundwater levels and allow early detection of any contaminated seepage from mining-related activities (**Commitment 8.3.2b**).
- Monitoring quality of water collected in pit sumps before re-use for ancillary uses. Water will not be re-used if analytical results indicate it is of low pH (**Commitment 8.3.2c**).
- Quarterly water quality monitoring of production bores and monitoring bores during the life of the operation to enable Territory Iron Limited to determine effects of mining on groundwater (**Commitment 8.3.2d**).
- A formal aquifer review will be conducted every two years to determine impacts on groundwater using all monitoring data. Results will be provided to regulatory authorities and other interested stakeholders (**Commitment 8.3.2e**).

Recommendation 8

The water monitoring program needs to incorporate management and prevention strategies.

4.3.3 Hydrogeology, Drawdown and Dewatering

Territory Iron Limited has highlighted the following issues associated with the proposed dewatering:

- Lowering localised groundwater levels as a result of mine dewatering;
- Discharge of water from mine dewatering causing localised recharge of groundwater;
- Increasing water flow to existing dams and Frances Creek from releasing water from mine dewatering operations;
- Changes in creek line vegetation due to dewatering discharges;
- Exacerbated erosion at dewatering discharge sites; and
- Cumulative impacts within the surface and groundwater catchment.

Australian Groundwater Technologies (AGT) undertook a hydrogeology study of Frances Creek (Appendix 5 of Frances Creek Project PER Volume 2). A hydrogeological conceptual model was developed that hypothesized the events of a localized, rainfall recharge driven, groundwater flow system coupled with discharge to local creeks including Frances Creek. On this basis, AGT explain that all township/mine site runoff / groundwater throughflow would ultimately find its way into the headwaters of the Frances Creek and into the Mary River to the east (AGT, 2006).

As determined by AGT, some pits (notably Helene 6/7 and 5) may be expected to intersect the water table and require dewatering at rates governed by the local permeability of the fractured rock aquifer, the depth of penetration below the water table and the area of the pit floor. Relatively large flow rates may arise from

dewatering of the deeper pits e.g. in excess of 23 L/s was estimated as the seepage into Helene 6/7 immediately after pumping out the stored water in November 2005 (AGT, 2006).

Theoretical, analytical estimates of pumping induced groundwater drawdown as recorded by AGT, indicate that the drawdown impact of pit dewatering at Frances Creek is expected to be of limited extent and totally reversible with full recovery of water levels anticipated within one wet season after pumping stops (AGT, 2006).

Any contaminants residing in a pit lake are likely to remain there or to move only a short distance into the surrounding fractured rock aquifer when driven by a recharge event. Subsequent evaporative discharge from the lake will tend to reverse this movement back towards the pit (AGT, 2006).

Vertical seepage from existing tailings areas may contain slightly elevated levels of iron due to the solubility induced by abrasion. The "Heavy Metals" may be similarly slightly enriched (AGT, 2006).

All groundwater uses examined by AGT in the local area are believed to be beyond the range of any physical impact due to extraction of groundwater for water supply or pit dewatering at any of the proposed Frances Creek mining sites (AGT, 2006).

As reported by AGT, increased flow of a stream due to disposal of pit dewatering water is not expected to result in any significant deterioration of aquatic environmental conditions and will essentially be a one off event terminating at the same time as mining. One possible minor impact may be the die off of vegetation which has been encouraged to flourish in the presence of increased flows due to dewatering.

Recommendation 9
High turbidity groundwater should be addressed by pumping to a temporary surface storage area to permit settlement of fines before discharging to the environment.

Recommendation 10
Discharges from any pit dewatering should only be released to surface waters if the quality is acceptable to 95% aquatic ecosystem protection levels.

4.4 Erosion and Sediment Control

Managing erosion and sediment transport throughout the Frances Creek Mine area is important in preventing soil loss and sedimentation, but also minimising dissection of gullies and impacts on road infrastructure such as culvert collapse and formation of ruts.

It has been noted that erosion is active and the area contains many dissected watercourses (Reilly et al, 2006 as cited in MBS Environmental, 2006a). This has the potential to be further exacerbated by different activities of the proposed mining project.

The following commitments have been provided by the proponent in dealing with the subject of erosion:

- Controlling slope gradients of landforms and soils to minimise erosion and soil loss (**Commitment 8.1.2.2a**).
- Installing diversion bunds and drains as necessary to control local surface water runoff to minimise overland flow and consequential erosion (**Commitment 8.1.2.2b**).
- Ripping rehabilitation areas on the contour to remove compaction, improve soil structure and improve infiltration capacity (**Commitment 8.1.2.2c**).
- Routinely inspecting rehabilitated and disturbed surfaces for erosion, particularly after significant rainfall. Implementing appropriate remediation measures if soil erosion is observed during routine inspections (**Commitment 8.1.2.2d**).
- As part of finalising design of the waste rock stockpiles, Territory Iron Limited will seek geotechnical advice (**Commitment S7**).
- Territory Iron Limited will install erosion control structures at erosion vulnerable points within the operations area (**Commitment S10**). Sediment ponds will also be constructed where necessary to ensure sediment does not leave operational areas and enter natural water systems.
- The need for construction of additional spillways or weirs at other dams will be evaluated. If the risk of collapse is considered high, suitable structures will be constructed (**Commitment S11**).

Recommendation 11
During operations and after mine closure, pit voids and waste rock stockpiles should undergo geotechnical assessment and design to stabilise disturbed areas and prevent collapse or landslides.

4.5 Waste Rock Stockpiles

Remnant waste rock stockpiles from previous iron ore mining at Frances Creek are at the south western end of the project area. New stockpiles of overburden, waste rock and ore product would be created as a result of the proposed mining operation.

Territory Iron Limited has investigated opportunities to backfill pits with waste rock rather than stockpiling and has determined that there is limited potential. Territory Iron Limited has stated the backfilling will only occur where it is economically feasible i.e. without double handling. Territory Iron Limited has estimated that about 3 Mt of overburden and waste rock will need to be moved annually, but expects that more than 10% of this will be backfilled into pits (MBS Environmental, 2006a).

In recognising the preferred operational procedure of backfilling pits as highlighted by DPIFM and the Northern Land Council (NLC), Territory Iron Limited commit to using the waste rock to backfill pits where total sulfur values in exposed siltstone waste rock in open pits exceed 0.1%S to minimise contact between in-pit water and siltstone in final pit voids (**Commitment 8.2.2f**).

Territory Iron Limited proposes to place waste rock stockpiles from the Jasmine East Pit in a number of small steep-sided valleys. Concerns were raised in comments over the proposed use of valleys for waste rock stockpiles which could result in simplifying habitat heterogeneity in the project area and altering flow regimes.

Territory Iron Limited states that waste rock stockpiles have been located in upper valleys to minimise impacts on water courses, with stockpile locations chosen to

preferentially fill upper valleys where no defined water course or distinct riparian vegetation exists (MBS Environmental, 2006b). However, ephemeral water courses are associated with the Helene 6/7 and Thelma Rosemary waste rock stockpiles, and will require diversion of surface water. Diversion drains are proposed so stockpiles no longer dam water courses, and to avoid leaching of runoff through any potentially buried carbonaceous siltstone waste.

Territory Iron Limited proposes that waste rock stockpiles will be built to a maximum height of 45m. Slopes are proposed to be up to 18^{o} to facilitate water shedding. Existing slopes are reported as often steeper than 18^{o}. In finalising design of the waste rock stockpiles, Territory Iron Limited will be obtaining geotechnical advice (**Commitment S7**).

Comments from DPIFM noted that 18^{o} represented a steep slope. *NT Land Clearing Guidelines (2002)* suggest any slope over 5^{o} is capable of generating erosive surface water flows. Unless managed successfully excessively steep slopes risk erosive soil loss, loss of rehabilitation efforts/potential, bank slippages, exposure and mobilisation of waste rock contaminants and safety issues for present and future users.

4.5.1 Backfilling Pits

The EPA Program does not consider Territory Iron Limited has adequately investigated the viability of alternatives for disposal of waste rock to sufficiently account for potential environmental impacts and future potential uses of the area.

Backfilling of pits has been proposed by Territory Iron Limited to be undertaken only where practicable and economically feasible. Commitment is made to backfill pits where total sulfur in exposed waste rock exceeds 0.1% **(PER Commitment 8.2.2f)**, although Territory Iron Limited predicts this finding is unlikely to occur. Firm commitment is thus not provided to place waste rock into historic or generated pits in preference to filling valleys, where water course obstruction and riparian habitat destruction may occur, as well as potential ongoing erosion and contaminant mobilisation. Economic reasoning appears to have dominated Territory Iron Limited's choices not to backfill pits, as environmental and legacy considerations suggest the opposite would be more appropriate. The EPA Program considers commitment should be made by Territory Iron Limited to backfill new and non-contaminated historic pits in preference to creating further legacies of waste-rock piles and the loss of valley microhabitats.

Recommendation 12
Territory Iron Limited is to provide commitment in its MMP to backfill new and non-contaminated historic pits in preference to creating waste-rock stockpiles.

Opportunities exits with the choice of waste rock stockpile locations to consider and maximise future potential uses of the sites. Evidence indicates the many of the sites have been and are currently utilised by various stakeholders for activities including recreational and 4WD camping, waterskiing and bush tucker collection. The current owner of the Ban Ban Springs Station pastoral lease has established plans and investment aimed at developing the area for tourist camping operations. The mine would conflict with this projected use, although comprehensive rehabilitation by Territory Iron Limited and consideration of potential future users has the potential to

minimise such longer term impacts from the mine. Design of bunds limiting future access to areas also invite similar considerations from Territory Iron Limited.

Recommendation 13
Territory Iron Limited is to consult with relevant stakeholders including the pastoral leaseholder to establish agreed designs and locations for waste rock stockpiles, and provide an opportunity for stakeholder input into rehabilitation and closure plans for the mine.

4.6 Radiological Issues

The proposed mining areas are immediately adjacent to and sometimes coincident with a regional zone of above average uranium concentrations (MBS Environmental, 2006a). The highest mean gamma reading for the site was 0.41 microsieverts per hour at Ochre Hill (MBS Environmental, 2006a). The estimated increased gamma exposure using this value was 0.22 millisieverts (mSv) per annum which is below the one microsievert per annum recommended exposure limit for members of the public (ARPANSA, 2005 as cited in MBS Environmental, 2006a).

The *Radiation Protection Act* applies to servicing, testing, installing, decommissioning, manufacturing, possessing, using, storing, transporting, disposing of or otherwise dealing with a radiation source. DHCS has advised that the *Radiation Protection Act* is not expected to apply to any mining operation in which the most exposed person could not receive a radiation dose that is greater than 1mSv per year.

Location	Background Radiation Levels (mSv per annum)
World Average	3.50
Australia Average	2.30
Pine Creek	2.63
Helene 5	3.50
Ochre Hill	3.17

Table 5: Comparison of background radiation levels

Western Radiation Services (WRS) has provided recommendations to Territory Iron Limited on potential radiation levels. In meeting these recommendations, Territory Iron Limited developed management and mitigation measures to prevent or minimise adverse impacts of radiation and include the following commitments:

- Stockpiling ore in open areas to prevent possible build up of radon gas (**Commitment 8.9.2a**).
- Mine personnel will be accommodated in Pine Creek, well away from the mineralised areas of the mine site (**Commitment 8.9.2b**).
- Ore will be blended at the crushing stage to keep overall uranium concentration well below levels of concern (**Commitment 8.9.2c**).

- Trialling personal dust monitors in initial mining of higher uranium areas to confirm exposure to uranium through dust is minimal (**Commitment 8.9.2d**).
- Installing passive radon monitors to measure radon gas exposure over a three month period (**Commitment 8.9.2e**).
- Potential radiation exposure of workers will be reviewed whenever additional monitoring data becomes available (**Commitment 8.9.2f**).
- Workers will be required to follow a strict hygiene policy, in particular they must wash their hands before eating, drinking or smoking (**Commitment 8.9.2g).**
- Access to the project site will be limited to employees and authorised visitors. All project access will be well signposted to control traffic movement in and out of the project area (**Commitment 8.9.2h**).

This is considered by the EPA Program to be an adequate approach to address radiation issues, if a commitment to dust monitoring is included.

4.7 Biological

4.7.1 Species of Conservation Significance

Although prior disturbance has occurred in the project area, fauna surveys conducted in the area by Low Ecological Services have indicated the habitat supports high species diversity. Eleven species of fauna classified as 'vulnerable' or 'near threatened' under the *Territory Parks and Wildlife Conservation Act*, including two reptiles, six mammals and three birds occur within the Frances Creek Project area. An additional nine species located in the area were listed as 'data deficient' due to the potential impact of cane toads on their distribution (MBS Environmental, 2006a).

The potential impacts of the proposal on species of conservation significance include habitat fragmentation, destruction of habitat, altered fire regimes, changes in native grass and vegetation composition and increased predation by feral animals. There are several near threatened or vulnerable species which potentially occur within the project area.

Recommendation 14
A Flora and Fauna Management Plan should be developed which includes, but is not limited to, strategies which remove or mitigate risk to wildlife and vegetation, with particular reference to species of conservation significance. The management plan should include, but not be limited to, the species listed in Appendix 7 of the PER.

The plan should identify likely locations of suitable habitat (including food resources, nest locations and breeding seasonality) and the potential impacts that may result from any operations. Strategies must be developed which stipulate how the impacts will be managed and what commitment will be made to enhancing nearby degraded habitat to offset disturbance during operations.

The management plan should include a monitoring and adaptive management component and refer to employee site induction as per Commitment S2.

A more proactive approach to wildlife management is required in addition to, and prior to, the need for the reactive component of Commitment S2, which states species

of conservation significance will be reported and managed when sighted and if impacts are likely.

This is consistent with Commitment S14 in regard to Calaby's Pebble Mound Mouse, Commitment S16 consultation with threatened species lists and the Cycad population management in Commitment 8.5.2.1f and Commitment 8.6.2e Gouldian Finch management. It also reflects the outcome of discussions held during the October 17 site visit by the EPA Program with regard to retention of the conveyor tunnel roost site for Ghost Bats and management objectives for Gouldian Finches and Red Goshawk nest site buffers.

Specific outcomes of these discussions included the following:

- Cycad protection by ensuring the population is clearly marked by highly visible flagging tape and designated a "no-go zone" and ensuring haul road widening occurs on the east side only.
- Ghost Bats protected by reassessing the need to remove the conveyor tunnel which is their roosting site and ensuring sound consultation with specialists prior to any disturbance occurring.
- Gouldian Finch habitat and alluvial flats wet season seed sources protected by developing management plans in consultation with relevant agencies.
- Red Goshawk nesting sites to be identified and 200-300m buffers created to prevent disturbance to breeding activities.
- Northern Quolls relocation opportunities must be discussed with appropriate agencies.
- Management of overall impacts on habitat value and condition by appropriate road drainage design, waste contamination management, managing weed s[read, minimising sediment movement and appropriate rehabilitation.

4.7.2 Feral Animals

Feral animal competition with native fauna for habitat, food and shelter is a threatening process for many of the significant flora and fauna species identified in the project area. Reduction of these feral impacts during operations may assist the native fauna in coping with the disturbance and changes to habitats throughout the mining area.

Several introduced (pest) fauna species were recorded during the two surveys conducted by Low Ecological Services. These included feral cats, donkeys, feral horses, feral pigs and cane toads. Cane toads are implicated in the disappearance of some native animals such as the Northern Quoll, (DEH, 2004 as cited in MBS Environmental, 2006a).

Both water buffalo and feral cattle are known to be present in the region and have been recorded from nearby Kakadu National Park (Woinarski et al, 1989 as cited in MBS Environmental, 2006a).

The effectiveness of small scale control programs will be increased by integration with wider regional control programs. The PER refers to co-operation with feral animal control programs at Ban Ban Springs and Mary River West Stations. Territory Iron Limited has committed to proactively seeking to be part of regional feral animal control programs.

Commitment S17 states that Territory Iron Limited will undertake Cane toad trapping programs during the life of the Frances Creek Project. It is strongly recommended that information be sought from the NT FrogWatch program for approved traps and trapping methodologies.

Recommendation 15
A Feral Animal Management Plan should be developed which includes, but is not limited to, strategies which assist with regional and local control programs in association with the Pastoral Lease Holders, Indigenous community and Parks Australia programs for Kakadu National Park.

The Plan should identify existing feral animal control programs in the local and regional area and stipulate how Territory Iron Limited will participate on partnership basis. In the event that minimal local and regional control is being undertaken, Territory Iron Limited should show initiative in demonstrating good governance and prepare strategies to reduce feral animal impacts on habitat and native species. Specific strategies must be developed for each of the species listed Section 6.7.2 of the PER and must comply with ethical standards of control.

4.7.3 Weed Management

Weeds are a major threat to ecosystems and will displace native flora and fauna. Invasion of native vegetation by weed species can have an impact on the function of the natural community. This can occur by weeds out-competing naturally occurring species, reducing the variety of native species and reducing the availability of food sources, shelter and nesting sites for wildlife.

Weed species can rapidly colonise areas following disturbance or degradation and then provide a source of infestation throughout an area. Weed spread can occur through contaminated vehicle and machinery movement, soil disturbance and relocation and water flow carrying seeds throughout gullies, wetlands and streams in normal flow and flood events. Spread also occurs by wind and can be carried on feral and native animals and by people on clothing. Contaminated hay and grains for stock food also spreads weeds.

Weed species impact on terrestrial and aquatic environments, agricultural productivity, Aboriginal food collection and bush medicines, aesthetic values and increase fuel loads and greenhouse gas emissions from fires.

Weed infestation has occurred on the Frances Creek project area, particularly in previously disturbed areas and in the TSF. (Reilly et al, 2005; 2006)

Surveys have recorded a number of weed species at varying densities across the southern portion of the site, with the old TSF recording most species in high densities. Weed species are listed in Table 3 with categories allocated under the Weed Management Act 2001. In addition to these species, Mission Grass (*Pennisetum polystachion*), a Class B Declared Weed, and Gamba Grass (*Andropogon gayanus*) are known to be widespread throughout the Pine Creek Bioregion (NRETA, 2006b).

Under the *Weed Management Act* land managers are required to prevent the spread of weeds in, into and out of the Territory and to ensure that the management of weeds is

an integral component of land management in accordance with the *Northern Territory Weeds Management Strategy 1996 – 2005* or any other strategy adopted to control weeds in the Territory.

Weed management will reduce the potential for spreading existing weeds beyond current locations and prevent introduction of any new species to the site and surrounding area.

Recommendation 16

A Weed Management Plan for the control and management of weeds should be prepared. The plan must identify, but not be limited to, location and species of weeds in and around the project location and outline methods for controlling existing infestations. It must identify actions to prevent introduction of new weed species from vehicles, machinery, freight trains or any other method.

4.7.4 Aquatic Fauna

The following commitments have been provided by the proponent for aquatic fauna management:

- Liaising, with the Northern Territory Parks and Wildlife Commission to ensure that appropriate relocation measures are used to relocate Freshwater Crocodiles, when required (**Commitment 8.6.2d**).
- Territory Iron Limited will undertake aquatic ecosystem assessment and monitoring as part of the catchment monitoring program detailed in the EMP (**Commitment S12**).
- Territory Iron Limited will include limnological monitoring as part of its operational monitoring programs (**Commitment S18**).

4.7.5 Biting Insects

Territory Iron Limited commissioned the Medical Entomology Branch (MEB) of the Northern Territory Department of Health and Community Services to do a biting insect (mosquitoes and biting midges) assessment of the Frances Creek project area. A site inspection and initial adult biting insect trapping was conducted between 8 and 14 June 2006. The report summarising the findings of the field visit is in the Frances Creek Project PER Volume 2 (Appendix 11).

Territory Iron Limited have stated that additional information on biting insect populations will be obtained during a 12 month adult biting insect trapping program which will conclude during 2007. Territory Iron Limited is aware of the Guidelines for preventing mosquito breeding sites associated with mining sites. These guidelines will be consulted during the design and decommissioning phases of the project.

During the site specific induction advising all employees of the potential for seasonal problems relating to biting insects including their potential pest, nuisance and disease carrying potential. All employees will be made aware of the diseases mosquitoes may carry (**Commitment 8.15.2a**).

Further to the above commitment, Territory Iron Limited will implement the following measures to assist with biting insect controls as identified by **Commitment S23**:

- The margins of all new dams will be kept clear of vegetation where practicable.
- The final surface of mine waste rock stockpiles will be contoured so that the surface area is free draining and has no surface depressions.
- Fish are already present in dams. Fish populations will be maintained to assist with control of biting insect larvae (**Commitment S23**).

4.8 Existing Tailings Storage Facility

The Tailings Storage Facility (TSF) is a result of previous mining and has developed into a functioning wetland (Reilly et al, 2005). It is not considered by Territory Iron Limited to be significant in a regional context with the use by fauna being considered opportunistic. Territory Iron Limited intends constructing the Helene 5 waste rock stockpile over this wetland. Building the Helene 5 waste rock stockpile will ultimately cover much of the swamp that has developed at the old TSF. Territory Iron Limited states that it has chosen this site to minimise native vegetation clearing and improve rehabilitation of a disturbed area from the previous mine.

The EPA Program observed (17 October 2006) this wetland to be degraded with weed species. In particular Candle Bush (*Senna alata*), which formed dense stands around the margins of the wetland (Photo 1 of Appendix 3 of this document). Although this wetland is providing habitat for fauna species, it is not considered to be of high regional value due to the prominent weed presence. In addition, the presence of larger water bodies in the vicinity with wetland characteristics such as the dams provide additional habitat for relocation of mobile species. The EPA Program considers the siting and design of the waste rock stockpile will need to maintain the existing surface water flow paths and retain the more permanent water pools of the TSF. A potential exists for contaminated leachate to be generated from the waste rock stockpile. Leachate and surface runoff through and around the rock stockpile will need to be monitored and water quality targets maintained prior to their release into receiving water bodies.

Recommendation 17
Siting and design of Helene 5 waste rock piles over the existing tailings storage facility should maintain existing surface water flow paths and retain the more permanent water pools. Leachate and runoff from the waste rock pile should be monitored to ensure water quality targets are met.

4.9 Waste Management

The PER and Supplement describe the proposed management of wastes. These have been differentiated into hazardous, non-hazardous and organic/putrescible waste streams.

4.9.1 Hazardous Waste

Territory Iron Limited proposes to prevent any potential discharges of hazardous material to the environment through a series of management and mitigation measures, as defined within the draft Waste and Hazardous Materials Management EMP (Appendix 12 of the PER) and **Commitments 8.10.2.1a - 8.10.2.4b**. The draft EMP defines handling, storage, standards, use and disposal of hazardous materials to be utilised by the project. Hazardous waste generated by the operation is to be

transported offsite to licensed waste disposal facilities. The EPA program supports these measures.

4.9.2 Non-hazardous, Putrescibles and Organic Wastes

In the PER the proponent proposes that non-hazardous wastes (inert and putrescibles) would be disposed of on-site in a landfill site, to be incorporated into the Helene 6/7 waste rock stockpile.

In response to the EPA program's further information request the proponent also indicated small volumes of general waste would be generated from offices, lunchrooms and maintenance workshops, including paper, cardboard, lunchroom wastes, bottles, aluminium cans and packaging materials. Estimation was made that less than 1,000 m^3 of such waste would be generated per annum.

A strategy is required to actively minimise waste generated on site and as far as possible inert waste should be recycled. Should it be necessary to dispose of putrescibles waste on site, such waste should be covered with earth immediately to avoid health hazards. In selecting a land-fill site, consideration should be given to potential future uses of the site so a site can be selected that is unlikely to be disturbed again.

Glass and aluminium are collected by contractors servicing the Pine Creek area. These should thus be separated from the mine and accommodation village's waste streams and arrangements made with contractors for their collection for recycling.

Territory Iron Limited proposes to dispose of earth moving tyres by burying them within waste rock stockpiles. The location of buried tyres is to be recorded.

Recommendation 18
Putrescible waste should be covered within a day of dumping to avoid health hazards. In selecting a land-fill site, consideration needs to be given as to potential future uses of the site (eg. further mining) to avoid future disturbance of the site.

Glass and aluminium should be separated from waste streams of the mine and accommodation village and arrangements made with contractors for their collection for recycling.

4.9.3 Ablution Facilities

An ablution unit (6 x 3 m) is proposed to be moved in conjunction with portable accommodation facilities between Ochre Hill, Thelma Rosemary and Jasmine East as required. The mobile ablution unit is to be self-contained. Territory Iron Limited proposed the facility would be either a dry composting unit or fitted with a holding tank which would periodically have effluent pumped out and trucked to an approved facility for disposal.

The NT Department of Health and Community Services (DHCS) advised that septic tank system designs and installation must comply with NT Codes of Practice, and recommended that the proponent seek advice from a qualified hydraulic consultant to determine the most suitable wastewater disposal system for the ablution unit. Territory Iron Limited has committed to complying with requirements of the Code (**Commitment 8.4.2.i**).

4.10 Access

Currently the area proposed for mining operations falls within Ban Ban Springs Station. The station is being used for cattle breeding and grazing. The area proposed for mine development is not utilised by the leaseholder for pastoral activities, however the manager has undertaken feasibility studies into the use of the area for eco-tourism, in particular the area around Ochre Hill. Residents in the area use the Frances Creek dam for water sports.

Aboriginal Areas Protection Authority (AAPA) has also advised that the indigenous custodians have indicated that they still carry out Indigenous land use activities such as hunting and resource collection in the region, as well as the recreational activities of camping and swimming.

Access to the Frances Creek Dam area has already been restricted by Territory Iron Limited due to exploration activities and for safety reasons Territory Iron Limited states it will not be possible to maintain unrestricted public access to the mine site once operational. Offsite visitors will be required to report to the office.

DPIFM have advised that if access to the Frances Creek Dam is to be limited or excluded during operations, this should be outlined as closure of access may impact on community expectations.

Public notices have been placed to this effect in Pine Creek and local newspapers. Response to this notice has resulted in an exemption being allowed for Katherine Water Ski Club. The community have been made aware of this via the notices and other community consultation undertaken as detailed in the PER. No adverse response has been received regarding this issue (MBS Environmental, 2006b).

The Wagiman group has also been consulted during the PER process. Territory Iron Limited will ensure that future discussions regarding land use and access include this group (**Commitment S22**).

Territory Iron Limited has committed to investigating alternative access routes and access arrangements to Frances Dam for concerned stakeholders.

Recommendation 19
Territory Iron Limited is to develop a communication strategy to ensure the public and surrounding community, including the Wagiman group are informed about changes to access to this site.

4.11 Cultural Heritage

Cultural heritage values form an integral part of human history and as such are protected under the *Heritage Conservation Act*. The principal object of this Act is to provide a system for the identification, assessment, recording and protection of places and objects of value. Sites of cultural heritage value in the proposed Frances Creek Mine area have been identified through a cultural heritage survey. Through the PER process a number of issues were raised.

Heritage Conservation Services noted that the proponent had undertaken an archaeological survey of mining tenement MLA 24727, and noted that the proposal included MLAs 25087, 25088, 25152, 25152, 25396 and 25529. While it is understood that a proportion of this land is disturbed through previous mining activity, the proponent had not investigated whether use of these areas will impact on cultural heritage resources. The proponent was advised to give consideration to cultural heritage issues for these additional areas by either investigating the potential for previously unrecorded places protected under the *Heritage Conservation Act* or demonstrating the extent of disturbance.

The archaeological survey report for MLA 24727 accorded recorded archaeological sites with a low to moderate level of significance on the basis of comparison with the Mt Porter sites complex. Although data describing archaeological site structure was provided for sites recorded within MLA 24727, this data was not provided for the Mt Porter sites on which the comparison was made.

The archaeological study acknowledged that the site known as Frances Creek 3 is relatively large in area and contains a dense and diverse range stone artefact types and stone raw materials and states that this site has the highest significance. The structure described within this study tends to indicate major occupation site and should arguably be accorded a high level of significance.

Comments by Heritage Conservation Services on specific commitments by Territory Iron Limited with regard to cultural heritage follow:

- **Commitment 8.12.2a** should focus on historical documentation of the existing rail spur line prior to the proposed upgrade to a haulage road. An archaeological survey should be undertaken for the 2.4 km section between the historical rail spur line and the Alice Springs to Darwin Railway and the proposed Roney siding. Consideration should also be given to the location of the proposed siding in relation to the existing cultural heritage studies for the Alice Springs to Darwin Railway (ADrail, 2003). Extant sections of the North Australian Railway (NAR) between Birdum and Darwin have been nominated to the Northern Territory Heritage Register and are currently under assessment. The proponent should consult with Heritage Conservation Services regarding the proposed crossing point and demonstrate how they will limit the damage to extant NAR infrastructure.
- **Commitment 8.12.2h**, should note that all archaeological places and objects, whether previously recorded or not and of high or low significance are afforded blanket protection under the *Heritage Conservation Act*. Consent is required from the Minister for Environment and Heritage or their delegate, if it is proposed to disturb archaeological places or objects (including isolated artefacts).
- The proponent states that only the site known as Ochre Hill 1 is scheduled to be impacted upon, meaning that the remaining 7 sites recorded (Frances Creek 1-5, Ochre Hill 1 & 2) during the archaeological survey of MLA 24727 (Hill 2005) are scheduled to be retained. Appropriate long term management strategies should therefore be devised and incorporated into any EMP / MMP to be drafted for the operations phase. These strategies should incorporate the views and or wishes of the Aboriginal traditional owners /custodians referred to in section 7.3 of the PER.

- The proponent should liaise with Heritage Conservation Services and provide more specific detail regarding recommendations (2, 3, 4, 5, 7 & 8) made by Hill (2005).

Territory Iron Limited has acknowledged that the assessment of Frances Creek 3 archaeological site is significant and that long-term management strategies for sites protection should be prepared.

Recommendation 20
A Cultural Heritage Management Plan for the protection of sites from any disturbance should be prepared to the satisfaction of Department of Natural Resources, environment and the Arts. The Plan must include employee and contractor induction and awareness of the significance of site protection and obligations under the *Heritage Conservation Act*.

It is noted that the proponent is seeking an AAPA certificate for the site, and this certificate must be included in the Plan.

4.12 Socio-economic

MBS Environmental has identified the following potential social and economic impacts:

- Increased local employment in the Pine Creek area;
- Increased use of Alice Springs-Darwin Railway;
- Increased use of Darwin Port;
- Increased traffic movements as material is imported and exported from the project area;
- Increased contribution to the Northern Territory and Federal economies as a result of royalties and payroll taxes;
- Increased pressure on Pine Creek accommodation and medical services;
- Increased business opportunities for local business;
- Temporary change of land use from pastoral to mining; and
- Potentially negative impact on tourism within the area.

It should also be noted that other companies are commencing operations or conducting feasibility studies in the region such as those listed below (DPIFM, 2006). Demand on resources and cumulative impact on the environment and services available in the Pine Creek region will need to be considered.

1. Burnside Project at Union Reef (GBS Gold);
2. Maud Creek Gold Projects (GBS Gold);
3. Mt Porter (Arafura Resources);
4. Spring Hill (Tennant Creek Gold);
5. Tom's Gully (RenisonConsolidated Mines);
6. Rustlers Roost (Valencia Ventures Inc); and
7. Brocks Creek (AngloGold Ltd).

In anticipation of the potential socio-economic impacts of the Frances Creek Project and other operations within the region, Territory Iron Limited will need to engage in mechanisms that keep stakeholders informed of operational plans, in particular employment opportunities for an indigenous workforce.

Recommendation 21
Territory Iron Limited should engage the services of the Indigenous Mining and Enterprise Taskforce (IMETF) and the Economic Development Committee (administered by DBERD) to assist with managing employment opportunities for indigenous workers.

4.13 Rehabilitation and Decommissioning

Territory Iron Limited provides brief outlines of plans for rehabilitation and mine closure in the PER and Supplement. Information provided tended to lack sufficient detail on how outcomes would be achieved. General approaches to rehabilitation and closure were outlined in aspects of Draft Environmental Management Plans (PER App.12) for Soil and Land Management, Vegetation Management, Aesthetic and Visual Management, Rehabilitation and Closure.

Commitments are made to developing a Weed Management EMP (**Commitment 8.5.2.2a**), Rehabilitation Plan (Section 6 of the Supplement) and Closure Plan within the first year of operation (**Commitment 10.3**), but potentially after operations begin. The proponent has committed that the mine closure plan will be refined as inputs from detailed project design, stakeholder consultation on end land uses and completion criteria and investigations/studies become available (**Commitment 23**, PER).

Objectives presented for the Rehabilitation and Closure EMPs included:

- Physical and geochemical stabilisation of all project components;
- Progressive rehabilitation of Territory Iron Limited disturbed areas;
- Establishment of self sustaining indigenous vegetation and habitats with local, native species;
- Safety of project components for future users including animals;
- Restoration of lease areas allowing pre-mining (pastoral) land use to be restored;
- Prevention of present or future ground or surface water contamination;
- Pit water stabilised to an acceptable quality.

4.13.1 Revegetation

Territory Iron Limited proposes in the Rehabilitation EMP that seed will be applied to ripped surfaces if natural revegetation has not established satisfactorily within two years of rehabilitation. No indication is presented that any seed collection or rehabilitation trials have occurred to date.

Considering the short life of the proposed Frances Creek Project (3 years), the EPA Program considers such planning elements need to be presented and approved within the first MMP, and rehabilitation preparation brought forward significantly. Local seed collections should have already begun, to allow for seasonality of fruiting, and to ensure availability of sufficient local seed supplies. Given the sparse local vegetation, the seed collections would need to be from the broader lease area. An on-site or local nursery propagating indigenous tube-stock should have already commenced. Rehabilitation and propagation trials should be continued through the mine's life to further refine rehabilitation plans.

Collection of seed and growing trials would be best carried out in consultation with local conservation groups (Greening Australia, NT Native Plant Society) and

traditional owners. This would provide positive opportunities for local indigenous employment.

Comments from DPIFM that best practice would be to apply seed at time of initial rehabilitation were discounted by Territory Iron Limited, who considered topsoil management more crucial to successful rehabilitation. Territory Iron Limited proposed to apply local native seed only where topsoil could not be directly replaced or where annual monitoring shows that vegetation establishment is not effective.

Recommendation 22
Collection of local indigenous seed stocks, establishment of a local nursery and on-site growing trials should be initiated prior to mining and continued until mine relinquishment. These roles are to be carried out in consultation with local conservation groups (Greening Australia, NT Native Plant Society) and traditional owners and provide opportunities for local indigenous employment. Rehabilitation and propagation trials should be continued through the mine's life to refine rehabilitation and closure plans.

4.14 Potential Impacts to Kakadu National Park World Heritage Area

A referral under the EPBC Act was submitted to the Commonwealth Department of Environment and Heritage (DEH) in relation to the Frances Creek mine. A decision was made that the proposed development constituted a Controlled Action under the following sections of the Act:

- Sections 12 and 15A (World Heritage).
- Sections 18 and 18A (Listed threatened species and communities).
- Sections 20 and 20A (Migratory species).

Potential impacts upon listed threatened or migratory species are discussed earlier in Section 4.7.1 of this assessment report.

The Frances Creek project area lies approximately 18 km from the boundary of the Kakadu National Park World Heritage Area. This is sufficiently far enough away that the project will have no visual, dust or noise impacts on the world heritage values of the park.

Surface water flows across most of the project area drain east via Frances Creek, ultimately flowing into the Mary River. The Mary River flows along the western edge of Kakadu National Park for about 20 km before flowing away from the park to the north-west. There is potential for surface water runoff to impact on Mary River water quality and subsequently Kakadu National Park.

All surface water flows from the Frances Creek project area will be subject to a Waste Discharge licence. The licence will require discharges to be monitored and kept below prescribed contaminant threshold levels designed to protect the receiving environment and beneficial uses of the waterway. These measures are expected to ensure there are no adverse impacts on water quality in the Mary River catchment.

A significant distance and dilution factor also exists between the Frances Creek mining lease and the Mary River adjacent to Kakadu National Park and Ramsar wetlands. This provides a further protective buffer against any potential impacts from

the mine on World Heritage properties and Listed Threatened Communities (Ramsar wetlands).

4.15 Issue-based Management Plans

The issue-based management plans outlined in the PER included the following issues applicable to the project:

- Aesthetic and Visual Management Plan
- Air Quality Management Plan
- Construction Environmental Management Plan
- Closure Management Plan
- Emergency Preparedness and Response Plan
- Environmental Training Plan
- Ethnographic and Archaeological Management Plan
- Fauna Management Plan
- Gouldian Finch Monitoring Program and Management Plan
- Groundwater Management Plan
- Noise and Vibration Management Plan
- Rehabilitation Plan
- Socio-Economic Management Plan
- Soil and Land Management Plan
- Surface Water Management Plan
- Vegetation Management Plan
- Waste and Hazardous Materials Management Plan
- Water Monitoring and Management Plan
- Weed Management Plan

In addition, other issues raised during the assessment of the proposal have identified several other plans which are applicable to the project. These are listed below:

- Flora and Fauna Management Plan (amalgamation of separate Fauna and Vegetation Management Plans)
- Fire Management Plan
- Feral Animal Control
- Cultural Heritage Management Plan

Recommendation 23
The following issue-based plans are developed in consultation with the relevant agencies and incorporated into the Mining Management Plan:

- **Flora and Fauna Management Plan**
- **Fire Management Plan**
- **Feral Animal Control**
- **Cultural Heritage Management Plan**

These management plans will need to be revised to incorporate the additional measures for environmental protection and monitoring that are contained in this Assessment Report. The issue-based management plans, as part of the Mining

Management Plan, will be used for implementing management and monitoring commitments made by the proponent in the PER and the recommendations detailed in this Assessment Report. As such, it will be a working document for the life of the mine and will require continual review in light of operational experience, monitoring results and changed circumstances.

Recommendation 24

Revised issue-based management plans covering construction and operation of the Frances Creek Project are to be submitted to Department of Primary Industry, Fisheries and Mines for approval prior to commencement of construction and operation. The management plans will be included as an appendix within the MMP.

In preparing each issue-based management plan, the proponent will include any additional measures for environmental protection and monitoring contained in this Assessment Report and recommendations made by the Northern Territory Government with respect to the proposal. The plans shall be referred to relevant NT Government Agencies for review prior to finalisation. The plans shall form the basis for approvals and licences issued under relevant NT legislation.

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