

from Roney Siding to the Port of Darwin. Construction of the siding has not been included in this assessment.

### **3 Regional Setting**

The following information has been provided by MBS Environmental (2006a)

The project area known as Frances Creek is:

- 180 km south-east of Darwin;
- 25 km north of Pine Creek;
- About 30 km south of Mary River National Park and 19 km west of the Kakadu National Park boundary; and
- Within the Mary River catchment.

By road the project area is about 30 km north of Pine Creek, which is situated on the Stuart Highway approximately 180 km south-east of Darwin (see Figure 1).

The Frances Creek project area is in the headwaters of the upper Mary River catchment. The Mary River catchment covers 8 000 km<sup>2</sup>, draining north-west into the ocean at Van Diemen Gulf, about 100 km east of Darwin.

Facilities currently available in Pine Creek include:

- A community library and museum;
- Numerous sporting facilities, including indoor/outdoor sports centre;
- Multi-resource centre and community hall;
- A supermarket and two licensed premises;
- Three fuel outlets and a take-away food outlet;
- A police station;
- Health clinic with two permanent nurses and visiting doctor from Katherine once a week; and
- Primary school including pre-primary.

Many other facilities are available in the regional centre of Katherine - 90 km away, or Darwin - 150 km away.

#### **3.1 Land Use**

The project area is on Pastoral Lease PPL 1111, NT Portion 695 (Ban Ban Springs Station) and Pastoral Lease PL 815, NT Portion 1630 (Mary River West Station). The NT Land Corporation owns the former rail spur line corridor which may be used for the haul road.

Ban Ban Springs pastoral station covers 1 800 km<sup>2</sup> and is used for cattle breeding and grazing. The Frances Creek Dam is occasionally used for water skiing. The proposed project area is not being used for grazing cattle or tourist accommodation.

Rangeland grazing of cattle occurs on Mary River West Station which adjoins Kakadu National Park and borders the Mary River. Access through this property is needed along the Mount Wells road to reach the project area.

## 3.2 Climatic Conditions

The Frances Creek area experiences a tropical monsoonal climate with extreme weather conditions which are typically part of the annual climatic cycle. Average rainfall in the region is 1 100 to 1 300 mm and falls between October and April. Most rain falls during the January to March period when the area is subject to tropical cyclones and associated tropical low pressure systems and monsoonal troughs.

The relatively high rainfall during the wet season consists of isolated showers and storms with prolonged periods of cyclonic depressions, particularly in the latter half of the wet season. Stream-flow throughout the catchment is highly variable as a result of thunderstorm activity, cyclones, and monsoonal rainfall. In the wet season, flood events are superimposed on a base flow. Very intense storms result in flood peaks with rapid run-off down broad, deeply incised flood-water channels, which can discharge large quantities of water in a very short period of time.

Air temperatures are relatively high and consistent from year to year. During the coolest time of the year (June to July), the mean monthly temperature for Pine Creek ranges from a minimum of 10 to 13 °C to a maximum 20 to °C. In the hottest part of the year (October to November), mean monthly temperature ranges from a minimum of 24 to 27 °C to a maximum of 37 to 41 °C.

The highly variable nature of the environment, especially the occurrence of extreme rainfall events in the wet season, presents a key challenge to management of the proposed mine.

## 3.3 Physical Environment

Land systems for the Katherine–Darwin Region have been described and mapped by Christian and Stewart (1953). The Frances Creek project area is located within the Brocks Creek Ridge Land System of the Katherine-Darwin Region (Christian and Stewart, 1953). A small section in the south-eastern area is the Cullen Land System (Christian and Stewart, 1953), however no mining activity is proposed in this granitic area. The two land systems form part of the broader geomorphological unit referred to as the Elevated Backbone Country (MBS Environmental, 2006a).

Reilly et al (2005; 2006) describe six land unit groups occurring across the lease area (Table 3).

<b>Brocks Creek Ridge Land System</b>	<b>Cullen Land System</b>
Ridge Crests and Slopes	Low Undulating Plains
Low Hills	Granite Hills
Riparian	
Small Alluvial Flats	

**Table 3:** Land unit groups occurring in the lease area (Reilly et al 2005 and 2006)

### 3.3.1 Geology

The Frances Creek project area is on the Pine Creek Orogen, a Lower Proterozoic sequence of sediments. Overlying the Pine Creek Orogen rock sequence are remnants

of Jurassic to Cretaceous sediments consisting of coarse sandstones with ferruginous material in the vicinity of iron deposits (MBS Environmental, 2006a).

Iron deposits in the project area occur as semi-continuous lenses. They are haematitic ironstones with isoclinal folds in the lower member of the Wildman Siltstone. The deposits crop out as prominent, discontinuous ironstone ridges up to 50 metres high over a strike length of 15 kilometres (AGT, 2006). The largest bodies of ore occur from south to north being Helene, Thelma 2, Ochre Hill and Saddle deposits (BMR, 1987). The ironstone ridges thicken within fold hinges at the Helene pits and are continued within carbonaceous phyllite and siltstone (AGT, 2006).

### 3.3.2 Groundwater

AGT completed a groundwater study of the project area in February 2006. A full copy of the report is provided in the Frances Creek Project PER Volume 2 (Appendix 5). Some of the key details as presented by MBS Environmental are as follows:

- Eastern and southern boundaries of the area examined in the AGT study are considered to form 'no flow' groundwater hydraulic boundaries, whilst the western boundary is a potential small groundwater province, and the northern boundary is a groundwater 'sink';
- AGT could not determine regional groundwater flow directions owing to paucity of standing water level information as bores in the region are clustered in terrain with highly variable elevation. Groundwater velocities also cannot be determined with any credibility; and
- Regionally, groundwater is typically low salinity with high levels of bicarbonate and a pH that is slightly acid to slightly alkaline.

## 3.4 Biological Environment

The Frances Creek project area lies in the Northern Territory's Pine Creek bioregion. This bioregion comprises foothills to the west of the Western Arnhem Land sandstone massive. The dominant vegetation types of the bioregion are tall open eucalypt forests of *Eucalyptus miniata* and *E. tetradonta* and mixed Eucalyptus woodlands (NRETA, 2006b).

No Threatened Ecological Communities (TEC) are known to occur within the Frances Creek project area. The flora species and vegetation communities recorded during the November 2005 and May 2006 surveys are generally common and widespread throughout the region.

Fauna of the Frances Creek project area is considered to be typical of the Pine Creek Bioregion (Reilly et al, 2006). The Pine Creek Bioregion is considered to be in moderately good condition and provides habitat for populations of some threatened species including the Gouldian Finch (*Erythrura gouldiae*), the Partridge Pigeon (*Geophaps smithii*) and one of the largest known colonies of the Ghost Bat (*Macroderma gigas*) (NRETA, 2006b).

### 3.4.1 Significant Vegetation and Flora

The plant species recorded within the proposed project area are generally common and widespread in the region. There are no vegetation communities of declared

conservation significance at either Commonwealth or Territory level (MBS Environmental, 2006a).

*Cycas armstrongii* is represented in a small population adjacent to the haul road to Ochre Hill. This cycad is classified as a threatened species and is protected under NT legislation. It is listed as Vulnerable under the *Territory Parks and Wildlife Conservation Act* (TPWC Act).

### **3.4.2 Significant Fauna**

Two landscape, flora and fauna surveys were conducted in November 2005 and May 2006 by Low Ecological Services (Appendices 7a and 7b of the PER). A number of fauna species of conservation significance were recorded during the two surveys. This included six mammal, seven bird and one reptile species. A further 13 species (including seven migratory species) listed under the EPBC Act, 15 species listed under the TPWC Act and six species listed under both Acts are expected to occur in the region, but were not recorded during either the November 2005 or May 2006 surveys. Appendix 4 of this document lists those species of conservation significance recorded from or expected to occur within the projected area with details of their threat status.

### **3.4.3 Aquatic Environment**

As reported by Territory Iron Limited, an above average wet season before the May 2006 survey enabled that aquatic fauna to be assessed. A total of eight fish, five frogs, two reptiles, one crustacean and two insects were identified. Cane toads were also observed in these areas. No aquatic fauna of conservation significance were observed. The Freshwater Crocodile (*Crocodylus johnstonii*) is a listed marine species under the EPBC Act 1999 and is protected under the Convention on *International Trade in Endangered Species of Wild Flora and Fauna* (CITES) of which Australia is a member country (MBS Environmental, 2006a). During the site visit on 17 October 2006 by the EPA Program, a juvenile freshwater crocodile was observed in Helene 4 Pit.

### **3.4.4 Introduced Flora and Fauna**

Due to the historical mining activities at Frances Creek and current mining activities taking place at nearby locations, MBS Environmental report that the vegetation of the project area's southern portion is in a degraded condition. A site visit to the Frances Creek Project area was conducted on 17 October 2006 arranged by the EPA Program (Appendix 3 of this document). Officers from the EPA Program were able to confirm the comment by MBS Environmental and observed that areas previously disturbed had a high incidence of weeds species and that the composition of vegetation communities in recovery had low species diversity.

Mining operations at Frances Creek were abandoned after flooding associated with Cyclone Tracey in 1974. The site was left to regenerate under natural influences. After 32 years, some areas have since developed into healthy tropical woodlands (Reilly et al, 2005 as cited in MBS Environmental, 2006a).

The landscape, flora and fauna surveys conducted in November 2005 and May 2006 identified a number of weed species in the Frances Creek project area. Weed species were recorded to varying densities and numbers across the project areas southern

portion with the old TSF recording most identified weed species in high densities, however weeds did appear to be confined to areas of previous disturbance (Reilly et al, 2005; 2006). Weed species recorded from the Frances Creek project area and surrounding areas are listed in Table 4. 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).

Species and common name	Weeds Management Act 2001 Status
<i>Cynodon dactylon</i> (Couch Grass)	Not a Declared Weed
<i>Pennisetum pedicellatum</i> (African Feathergrass/ Annual Mission Grass)	Not a Declared Weed
<i>Mimosa pudica</i> (Common Sensitive Plant)	Class B/Class C Weed
<i>Euphorbia heterophylla</i> (Painted Spurge)	Not a Declared Weed
<i>Calopogonium mucunoides</i> (Calopo)	Not a Declared Weed
<i>Crotalaria goreensis</i> (Gambia Pea)	Not a Declared Weed
<i>Passiflora foetida</i> (Stinking Passion Vine)	Not a Declared Weed
<i>Senna alata</i> (Ringworm Scrub/Candle Bush)	Class B/Class C Weed
<i>Hyptis suaveolens</i> (Hyptis/Horehound)	Class B/Class C Weed

**Table 4:** Invasive and weed species identified in the Frances Creek Project area and nearby areas (MBS Environmental, 2006a).

Several introduced (pest) fauna species were recorded during the two surveys. These included feral cats, donkeys, feral horses and feral pigs. Both the 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).

Cane toads were also recorded during the two surveys. It is estimated that Cane toads arrived in the area during 2003 and may be responsible for disappearance of some native animals from the area, particularly the Northern Quoll (*Dasyurus hallucatus*) (DEH, 2004, as cited in MBS Environmental 2006a).

### 3.5 Cultural Environment

Mr Tim Hill conducted a cultural heritage survey on the Frances Creek, Ochre Hill and Miller Deposit which was completed in October 2005. Seven historical areas from the original Frances Creek mine were recorded during the survey. The only intact building recorded was the old Frances Creek church. Only concrete pads and building materials remain from other buildings. The most commonly-encountered sites during the archaeological survey were rubbish tips and metal dumps.

The study concluded that Frances Creek railway was the only European heritage object of value.

A search of the Australian Heritage Database in June 2006 showed no registered sites within the Frances Creek area (MBS Environmental, 2006a).

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