

PUBLIC
ENVIRONMENTAL
REPORT

Aircraft Landing Area at
Andranangoo Creek West

Prepared for

Matilda Minerals Limited

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10 October 2007

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Acronyms

Contents

Abbreviation	Definition
AAPA	Aboriginal Areas Protection Authority
ABS	Australian Bureau of Statistics
AFD	Australian Fuel Distributors
AGO	Australian Greenhouse Office
ALA	Aircraft Landing Area
AMS	Aerial Medical Services
Andranangoo	Andranangoo Creek West
BFV	Barmah Forest virus
BOM	Bureau of Meteorology
BPT	Best Practice Technology
CAAP	Civil Aviation Advisory Publication
CAR	Civil Aviation Regulations
CASA	Civil Aviation Safety Authority
CDEP	Community Development Employment Projects
CO ₂	Carbon dioxide
Defence	Defence Forces
DEH	Department of the Environment and Heritage
DEW	Department of Environment and Water Resources
DEWR	Department of Employment and Workplace Relations
DHCS	Department of Health and Community Services
DPI	Department of Planning and Infrastructure
DPIFM	Department of Primary Industries, Fisheries and Mines
ECNT	Environment Centre of the Northern Territory
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	Environment Protection Agency Program
EPBC	Environment Protection and Biodiversity Conservation
HCS	Heritage Conservation Service
HSEC MS	Health, Safety, Environment and Community Management System
Jayrow	Jayrow Helicopters
KV	Kunjin virus
Matilda	Matilda Minerals Limited
Minister	Minister for Natural Resource, the Environment and Heritage
MMP	Mining Management Plan
MNES	Matters of National Environmental Significance
MVEV	Murray Valley encephalitis virus
NEPM	National Environmental Protection Measures

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NHMRC	National Health and Medical Research Council
NPI	National Pollution Inventory
NRETA	Department of Natural Resources, Environment and the Arts
NT	Northern Territory
PER	Public Environmental Report
RAAF	Royal Australian Airforce
RMCP	Rehabilitation and Mine Closure Plan
RRV	Ross River virus
TLC	Tiwi Land Council
TILG	Tiwi Island Local Government
TPWC	Territory Parks and Wildlife Conservation
URS	URS Australia Pty Ltd

Executive Summary

ES 1 Introduction

ES 1.1 Background

Matilda Minerals Limited (Matilda) proposes to construct an Aircraft Landing Area (ALA) adjacent to their existing mineral sands mining operation, at Andranangoo Creek West (Andranangoo), Melville Island, Tiwi Islands, Northern Territory (NT) (Figure ES.1). The ALA will be suitable for aircraft with a maximum take-off weight of 5.7 tonnes (nine-seater aircrafts, or smaller), and will be used by charter aircraft from Darwin for the purposes of routine and emergency transport of personnel, visitors and supplies to the mine site.

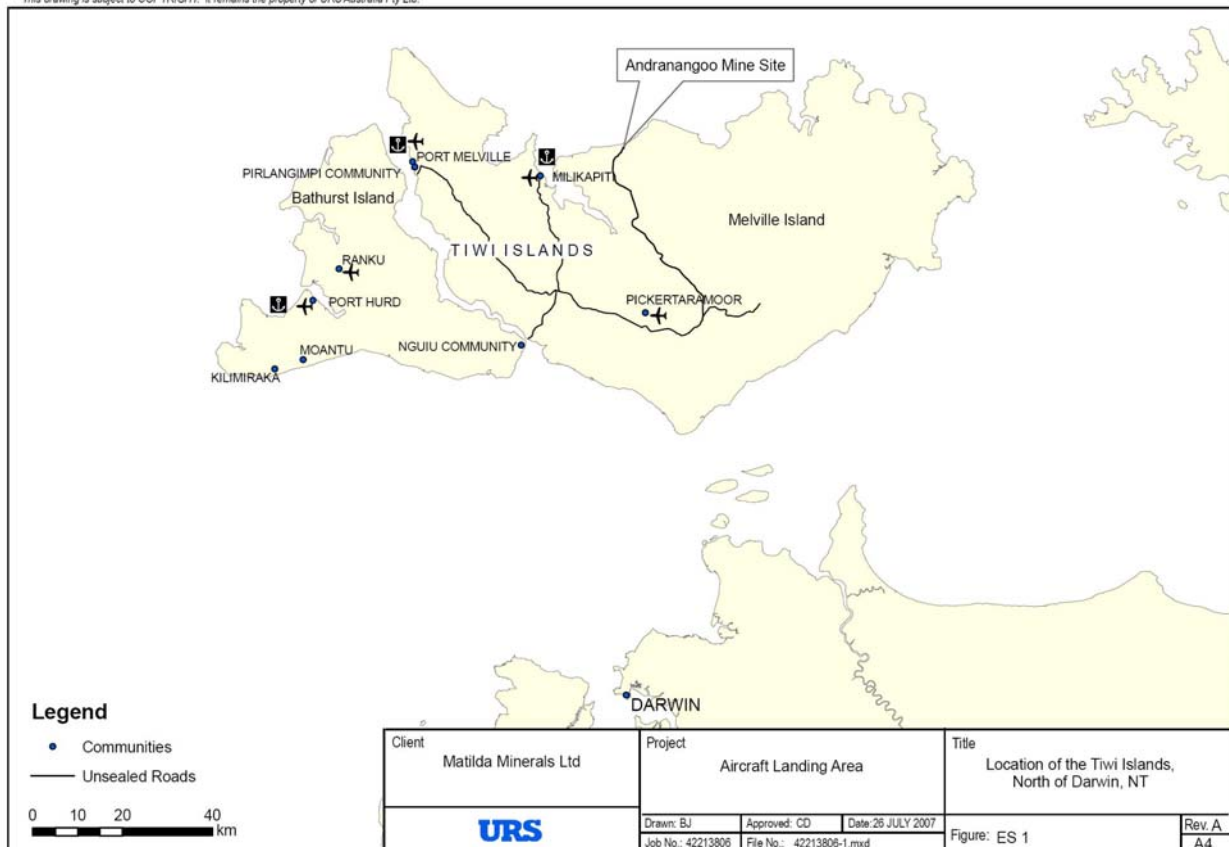
The objective of this Public Environmental Report (PER) is to identify and assess the environmental and related impacts that could potentially occur as a result of the construction and operation of the ALA and detail management strategies to mitigate impacts while addressing the criteria detailed in the Guidelines. Assessed impacts of the ALA construction and operation in terms of the natural, social and economic are summarised in the context of the project.

Management strategies are proposed in terms of Matilda's existing Environmental Management System (EMS) and draft Environmental Management Plans (EMP's) detailing management of the potential environmental issues relevant to the ALA project on an on-going basis.

Matilda has consulted with the Tiwi Land Council (TLC), Traditional Owners, the Tiwi Island Local Government (TILG) and the local community during the planning stages of this proposal, and these groups have indicated strong support for the development of the ALA.

Complete background information on Matilda's mineral sands mining operations at Andranangoo and Lethbridge Bay West are provided in the Draft Environmental Impact Statement (EIS) (URS 2006a) and EIS Supplement (URS 2006b), submitted to the NT Government in February 2006.

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ES 1.2 Justification

Matilda currently transport mine personnel, contractors and visitors from Darwin to the Andranangoo mine site via charter aircraft to the existing ALA's (primarily Pickertaramoor) and then by road in 4WD vehicles. The one-way trip from Pickertaramoor to Andranangoo is 60 km and takes between one and three hours one way, while the trip from Milikapiti is 130 km and takes between two and four hours one way.

During the 2006-2007 wet season road conditions between the mine site and existing ALA's deteriorated quickly and sometimes resulted in an increase travel time under hazardous driving conditions. For approximately three months of the wet season the roadway was impassable to heavy machinery and impassable by light vehicle for one month resulting in the requirement to rely upon helicopter transport. Conditions also restricted the use of Pickertaramoor airstrip, resulting in the requirement to utilise sealed airstrips located farther from site.

Furthermore, Matilda was advised that NT Aerial Medical Service (AMS) does not have dedicated access to helicopters and cannot guarantee being able to charter one if required in an emergency.

Matilda proposes to construct an ALA to satisfy the objective of managing and reducing Matilda's health, safety and environmental risks. This will be achieved through operation of an ALA adjacent to site operations resulting in the following benefits:

- Improved safety by allowing rapid evacuation of personnel and visitors in the event of a cyclone or medical emergency;
- Reduced likelihood of health and safety risks (worker fatigue) by decreased travel time to the site for staff and visitors;
- Reduced environmental, health and safety risks by reducing the need to travel by road during the Wet season when water levels are high and road conditions are unsuitable for driving; and
- Reduced risk of spreading weeds by eliminating the need to drive through weed-infested areas near Pickertaramoor (the primary airstrip being used).

Following closure of the mine site, it is proposed that the ALA would be managed and operated by the TLC. Consultations with the TLC and local Traditional Landowners have indicated that they consider the ALA will be a lasting asset, and will provide the infrastructure for future business opportunities through improved access to the area in addition to the benefits described above. If, upon mine closure, the Tiwi people do not wish to accept responsibility for the ALA then Matilda will rehabilitate the area as per the mining area.

ES 2 Description of Proposal

ES 2.1 Location

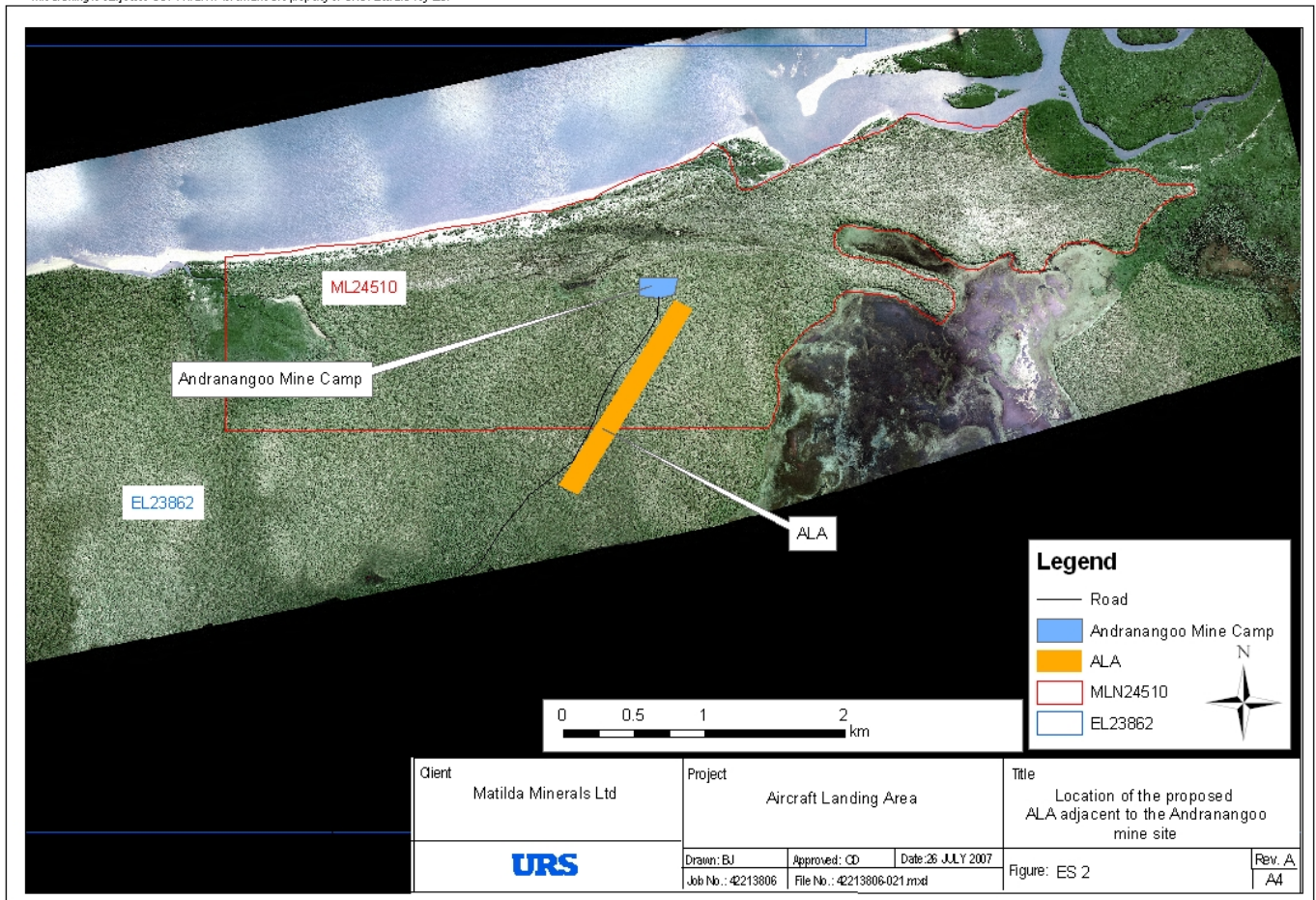
The Andranangoo mining lease is located on the northern coast of Melville Island (Figure ES.1). The proposed ALA is to be constructed parallel to the existing access road to the mine site (Figure ES.2).

The site for the proposed ALA is on laterite escarpment, approximately 1 kilometre from the beach and 900 metres west of Andranangoo swamp. The existing vegetation is eucalypt woodland, which is common throughout Melville Island.

The land on which the mine site and the proposed ALA are located is Aboriginal land, traditionally owned by the Yimpinari group. The ALA is located partly on mining lease MLA 24510, and partly on exploration lease EL 23862, both of which are held by Matilda.

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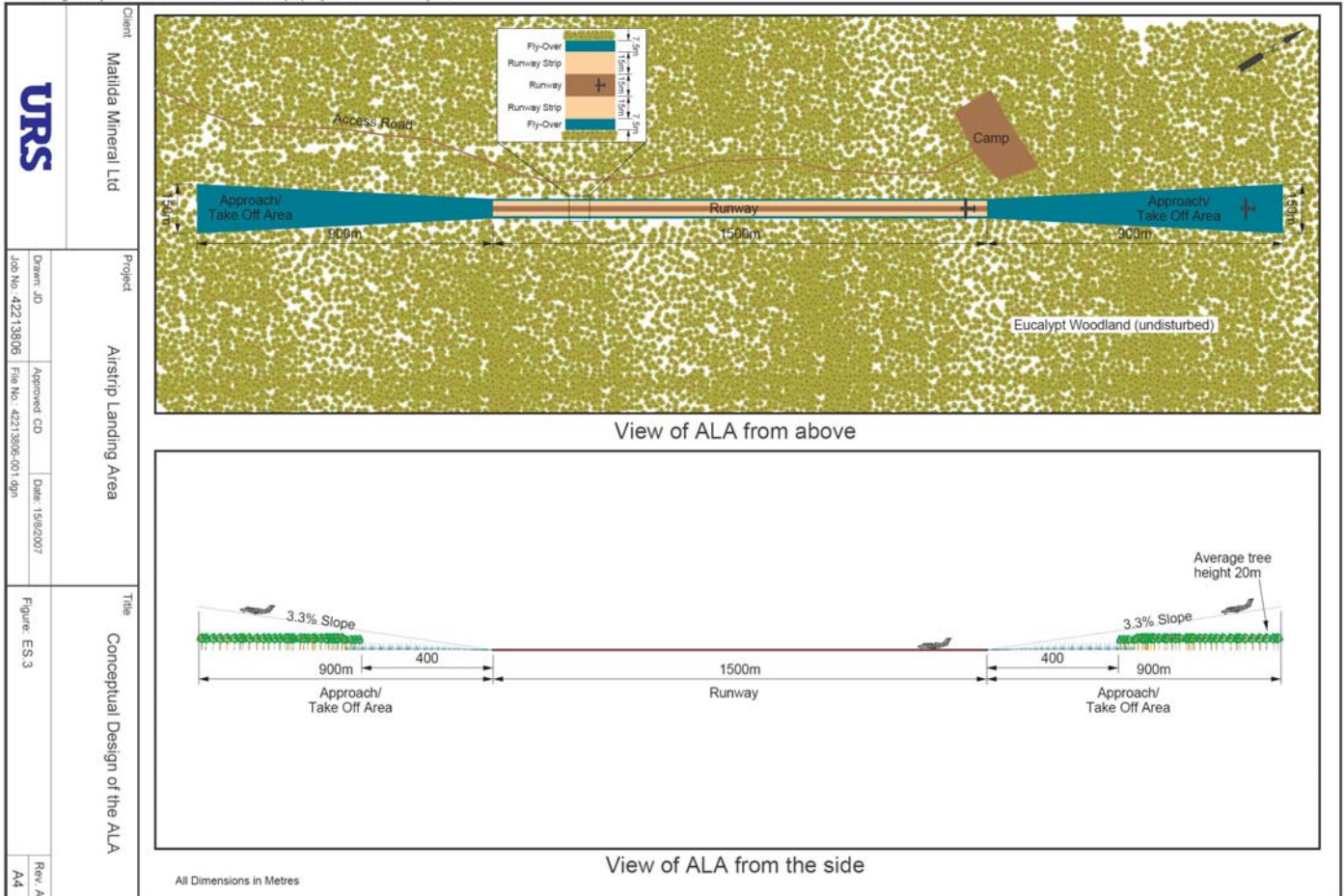
ES 2.2 ALA design

The ALA has been designed in accordance with the Civil Aviation Advisory Publication (CAAP) No 92-1(1), as recommended by CASA (Figure ES.3). The main Runway is 15 metres wide, bordered by a Runway Strip (15 metre width) and a Fly-Over Area (7.5 metre width) along each side; a total of nine hectares in total. These areas will be cleared of all vegetation and surfaced with compacted gravel.

At each end of the Runway, an Approach and Take-Off Area will be maintained. These areas will be cleared of tall vegetation only, on a slope of 3.3% from the ends of the Runway. As the maximum tree height in the area is only 20 metres, this partial clearing will only need to extend to a maximum of 400 metres from the Runway ends; after this point the tree height will be below the 3.3% slope line. The area affected by this partial clearing will be 3.7 hectares at each end of the ALA (7.4 hectares in total).

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ES 2.3 Site preparation and construction

The proposed ALA site will be cleared of vegetation using bulldozers and earthmoving machinery that is currently in use at Matilda's mine site. Trunks and debris will be piled in designated areas and burnt. However, if rehabilitation of the ALA is required, as identified during the PER process, the cleared vegetation would remain stockpiled for re-spreading during rehabilitation.

Cycads, discussed further in Section ES.4.2, will be relocated and offered to the local Tiwi community, for sale to collectors and nurseries, with any income provided to the TLC.

The Runway will be levelled using a grader and compacted with a heavy roller. Surface water drains will be formed by a grader along the edges of the Runway Strips to collect stormwater runoff, which would be directed at non-scouring velocities, using turn-outs, into the surrounding vegetation. Shrubs and trees in the Fly-Over areas in excess of the required height will be removed and vegetation debris left in place using the blade of a bulldozer. A short access track (less than 100 metres) will be installed to link the ALA with the existing road to the mine site.

Matilda proposes to construct the ALA as soon as possible, so as to secure access to the mine site over the wet season of 2007-2008. Government approvals pending, construction is planned to begin in November 2007 and will take approximately four weeks.

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ES 2.4 Operation and maintenance

It is proposed that the ALA would be used for charter aircraft from Darwin, and will be suitable nine-seater aircraft or smaller for the emergency and routine transport of personnel, visitors and supplies directly to the mine site, typically three to five times per week.

During operations, activities required to maintain the ALA will mainly relate to the condition of the surface particularly following heavy rains and prompt removal of regrowth vegetation. Matilda would use existing machinery and personnel from the mine site or contract TILG to complete maintenance work.

Matilda anticipates completing mining operations at Andranangoo in 2010. Upon mine closure, Matilda proposes to leave the ALA in an operational state at the request of the local community. The TLC would then be responsible for maintenance and operation of the ALA, and could utilise the facility to provide access to the Andranangoo area for business opportunities such as fishing charters. If, upon completion of mining activities, the Tiwi people do not wish to retain the operations and maintenance of the ALA Matilda rehabilitate the area; similar to the current arrangement for the mining camp.

ES 3 Alternatives

As part of the PER process, the following alternative transport arrangements for the Andranangoo mining operation were considered in terms of routine and emergency travel:

- Fixed wing aircraft direct to Andranangoo ALA (current proposal)
- Fixed wing aircraft direct to current ALA's and road travel to Andranangoo (current arrangement 'do nothing')
- Helicopter direct to Andranangoo
- Boat direct to Andranangoo
- Sea Plane direct to Andranangoo

These alternatives are discussed below, and then ranked.

ES 3.1 Fixed wing aircraft direct to Andranangoo ALA

Fixed wing aircraft direct to Andranangoo ALA is the most cost effective, reliable and efficient option in terms of routine and emergency travel. Environmental issues associated with this system include land clearing that otherwise would not occur, and issues that will require on-going management such as weed and pest control, and surface water and erosion control.

ES 3.2 Light aircraft to existing ALA's, and road to Andranangoo

The current arrangement, fixed wing aircraft direct to current ALAs and road travel to Andranangoo ('do nothing') is not considered feasible because of: potential delays to treatment or evacuation in case of emergency; increased health and safety risks due to long driving times and hazardous road conditions; increased erosion on roadways and required maintenance; and increased risk of weed spread from known infested areas (current ALA). This option is not reliable in case of emergency due to the distance required to travel to the current ALAs and unpredictable road conditions.

ES 3.3 Helicopter Direct to Andranangoo

A helicopter landing pad was included in the original EIS for the mining operation and there is now a cleared area used for landing. Helicopters were used when road closures required for routine travel during the 2006-7 wet season. However, this option is not considered feasible in the long term because: it is not a cost effective routine transport option due to high cost per trip and low weight restrictions per

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trip and to ensure availability in case of emergency it is not economically feasible (approximately \$30,000 per month).

ES 3.4 Boat travel direct to Andranangoo

There are no existing ports or jetties in the vicinity of the mine site, and landing a passenger boat near Andranangoo would be difficult due to shallow waters and mudflats along the island coast. Boat landings would be subject to tides and weather conditions, and dredging may even be required to create a landing point.

Travel time from Darwin would be excessive for routine passenger transport and emergency evacuation, lasting approximately 2.5 hours for a passenger boat and 18 hours for a barge.

This option may also require access to Andranangoo beach, which was restricted as an approval condition of the EIS for Matilda's mining project, to minimise disturbance to nesting sea turtles.

Boat travel direct to Andranangoo is therefore not considered a feasible transport option.

ES 3.5 Seaplane travel direct to Andranangoo

There are no seaplanes in the NT that are available for chart from Darwin to the Tiwi Islands. It is not economically feasible for Matilda to purchase a sea plane and hire a trained pilot.

Further, seaplanes require a well-protected area for take-off and landing; the only suitable area in the vicinity of Andranangoo would be the Andranangoo Creek, to the east of the mining area. However, this area is strongly affected by tides, and sand banks are occasionally exposed. Also, during wet season rainfall, vegetation debris can be washed into Andranangoo Creek.

The area is a known crocodile habitat, creating safety risks for personnel.

This option is not feasible in terms of reliability, availability, cost effectiveness and managing Matilda's health, safety and environmental risks, and would breach the EIS approval conditions for the mining operations.

ES 3.6 Assessment of alternatives – Best Practice Technology

A best practice technology (BPT) assessment of the various alternatives for transport to Andranangoo was completed as part of this PER to account for the following criteria:

- Environmental best practice – the level of environmental protection, and the environmental costs or benefits incurred;
- Cost-effectiveness – the costs of implementation, when compared with the level of environmental protection achieved by that option;
- Practicality and effectiveness – how that option contributes to efficiencies in the associated business;
- Maintenance and liability – the age of any equipment or facility employed may affect its integrity and contribute to a higher environmental risk; and
- Social factors – consideration of the views of the regional community. For example, a technology that improves the level of environmental protection may also have negative social consequences, in terms of employment or access to recreation by the local community.

Each option was assessed against the five criteria, and a performance ranking was applied where a score of 1 is "poor"; 2 is "fair"; and 3 is "good". By adding the scores from all five criteria, a total performance ranking was derived and a "preferred" option was obtained.

The BPT assessment for the transport options to the Andranangoo mine site is briefly summarised in Table ES.1. It is noted that on the basis of this assessment, the proposed construction of the ALA and

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retention of the ALA after mining is the preferred option. This is closely followed by construction of the ALA and rehabilitation, and then direct helicopter transport to the mine site. The existing situation (existing ALA's plus road transport), boat transport and sea plane transport were the lower rated of the six options.

Table ES-1 Best Practice Technology assessment for transport options to Andranangoo mine site
(Scoring: 1 = poor, 2 = fair, 3 = good)

Environmental Best Practice	Cost	Practicality and Effectiveness	Maintenance and Liability	Social Factors	Total Ranking (/15)
Construction of Andranangoo ALA for mine transport, and handover to Tiwi people after mining					
2	3	3	2	3	13
Construction of Andranangoo ALA for mine transport, and rehabilitation after mining					
3	2	2	3	2	12
Flight to existing ALA's, road transport to Andranangoo					
2	1	1	2	2	8
Helicopter transport direct to Andranangoo					
3	1	2	3	2	11
Boat transport direct to Andranangoo					
1	1	1	1	1	5
Seaplane transport direct to Andranangoo					
1	1	1	1	2	6

ES 4 Environmental Issues and Management

A brief description of the current site conditions, potential environmental issues as a result of construction of the ALA and proposed management (commitments) is provided below.

ES 4.1 Landform, soils and hydrology

Construction of the ALA will require vegetation clearing and compacting of the soil surface. As the site is naturally flat the project will not significantly alter natural landforms and drainage lines. However, stormwater runoff will increase as infiltration of rainfall into the cleared hardpan will be significantly lower than the natural vegetated surface.

The proposed ALA is located on relatively level, upland terrain that contains no creeks or drainage features. The ALA site is located sufficiently distance from surface water bodies and appropriate drainage will be installed therefore any increase in stormwater runoff is not anticipated to impact stream flows or contribute to sedimentation in those watercourses.

Soil erosion risks will be managed to preserve the ALA in good operational condition and to protect the surrounding environment from sedimentation and soil degradation. Matilda will install appropriate drainage as described previously and will expand the current soil erosion monitoring program to include the ALA.

ES 4.2 Flora

Two flora surveys of the proposed ALA site were completed, during the late dry season (October 2006) and the late wet season (May 2007). The vegetation occurring within the ALA is characteristic of extensive areas of upland terrain on the Tiwi Islands. The vegetation community throughout the site is described as tall woodland to open woodland.

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Cycads (*Cycas armstrongii*) were common in the area to be cleared for the ALA, and are listed as Vulnerable under the TPWC Act. Mean cycad density was calculated as 808 (± 234) per hectare however the distribution is patchy, varying from zero to 24 plants per 0.01 hectare plot (Metcalf 2007a).

Matilda has been issued with a *Permit to Take Wildlife for Commercial Purposes* to remove this species, from NT Parks and Wildlife, NRETA. Cycads will be relocated and would be available to the local Tiwi community for sale to collectors and nurseries, with any income provided to the TLC.

No weed species were observed within the ALA during flora surveys in October 2006 or May 2007.

Weed management at the ALA will be integrated into Matilda's existing weed control program to include: regular monitoring, prompt control, education and training of mine site personnel and continued cooperative island approach with the TLC.

ES 4.3 Fauna

A fauna survey of the proposed ALA site was conducted in September 2006. Vegetation at the proposed ALA site consists of eucalypt open forest, which is a common habitat type on the Tiwi Islands and across the NT Top End.

A total of 46 species were recorded during the field survey. Two of the species recorded in the survey are listed under the TPWC Act: the brush-tailed rabbit-rat is listed as Vulnerable; and the masked owl which was incidentally recorded during the survey and is classified as Endangered (also Endangered under the EPBC Act). The leaden flycatcher and rainbow bee-eater were two other significant species that were recorded during the survey, listed under international agreements.

Construction of the ALA will involve removal of habitat that is widespread throughout the Tiwi Islands, and is surrounded by relatively vast areas of undisturbed similar vegetation; therefore it is considered that the proposed ALA will impact fauna at a local scale only. With regard to listed species, the ALA development will likely result in the loss of habitat for species with a small home range, but that this would not affect the overall population of the species on Melville Island.

During ALA construction, Matilda will avoid widespread dumping of sands, soils and other materials during construction that might impact on surrounding vegetation.

Matilda has expanded the current Fauna EMP to include the ALA and will continue to monitor for introduced species. In addition, Matilda will install and monitor cane toad traps around the edges of the ALA.

ES 4.4 Archaeology and heritage

An archaeological survey of the ALA site was completed in November 2006. No Aboriginal archaeological sites or objects were identified during the survey. The proposed ALA site is a weathered and lateritised plain and there are no features in the area such as creeks or higher ground that could have been the focus of resource use in the past. Therefore, the possibility of archaeological material on the proposed ALA is low (Crassweller 2006).

The TLC undertook consultations with Traditional Owners on behalf of the Aboriginal Areas Protection Authority (AAPA) during the EIS process for Matilda's mining operations in 2005 and again in 2007 for the proposed ALA. An additional AAPA certificate has been received for the proposed ALA.

ES 4.5 Air quality and noise

Construction activities will be undertaken during daylight hours only and noise is likely to be comparable with the noise impact of roadworks that already occur regularly across Melville Island.

During operation of the ALA, it is anticipated that three to five fixed wing planes per week would land at Andranangoo as opposed to the current primary ALA at Pickertaramoor. The low level of aircraft traffic is considered unlikely to cause a significant noise impact, and disturbance would be localised.

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Fire is a common throughout Melville Island and Matilda completes fuel reduction burning around the mine site to minimise the risk of wildfires during the dry season. The ALA project will increase the footprint of the operational area, however it will provide an additional firebreak therefore any corresponding increase in fuel reduction burning will be minimal. This small increase in smoke emissions is unlikely to be a nuisance to communities, or a significant disturbance to wildlife.

Dust emissions generated during the construction, operation and maintenance of the ALA are likely to be localised and short-lived. Matilda has a water truck at the mine site and it will be available for dust suppression if required.

ES 4.6 Traffic and transport

There are approximately 280 kilometres of unsealed roads on Melville Island, and 250 kilometres on Bathurst Island in addition to numerous tracks. Traffic on the primary roads includes small private vehicles, trucks carting fuels and supplies to companies operating and haul trucks carting products to Port Melville. Roads require regular maintenance, as heavy wet season rains often result in erosion and degradation of the road surface.

There are eight existing ALA's on the Tiwi Islands of which Matilda primarily utilises Pickertaramoor, Milikapiti and to a lesser extent Pirlangimpi. Workshops and fuel stores for charter aircraft companies are all located in Darwin. Planes fly to the Tiwi Islands and generally return directly, with minimal time spent on the ground.

Barge services from Perkins Shipping Group (Perkins) and the Tiwi Barge Service run from Darwin to established barge landings at Milikapiti and Garden Point on a weekly basis to ferry bulk goods and supplies. All goods are unloaded by PenSyl Pty Ltd and loaded onto trucks for transport around the Islands.

In the February 2006 EIS Matilda proposed to use existing road and ALA facilities on Melville Island for transporting goods and personnel between Darwin and the mine sites. Since commencing mining activities in mid 2006, and particularly over the 2006-7 wet season, it has become apparent that this transport system is impractical for the reasons highlighted previously in Section ES.1.2.

Following construction of the proposed ALA, Matilda's requirement to travel by road between the mine sites and the existing ALA will be removed, thus reducing health, safety and environmental risks such as worker fatigue, driving in poor road conditions, soil erosion from roads, and high fuel consumption.

During ALA construction, operation and maintenance, minimal additional impacts beyond current mining operations are anticipated on road traffic as machinery will be sourced from the existing mining operations where possible. Matilda's existing procedures for traffic management and driver fatigue will extend to the ALA project.

ES 4.7 Waste and hazardous substances

During the construction phase of the ALA, vegetation will be cleared to ground level and pushed into discrete heaps. Vegetation debris from primary clearing areas will either be burnt, or, if rehabilitation of the ALA is preferred following completion of mining, cleared vegetation would remain in stockpiles for later respreading on the site during the rehabilitation process.

Waste streams created during the operational phase of the ALA will be very minimal, limited to the collection of domestic waste, which will be disposed of in the existing landfill facility at the Andranangoo mine site.

During construction and maintenance of the ALA, refuelling and servicing of machinery and equipment will be carried out at the workshops at the Andranangoo mine site in accordance with existing standards, procedures and guidelines. During the operational phase, it is not proposed to handle or permanently store aircraft fuels in or around the ALA; it will be the responsibility of charter aircraft operators to complete refuelling at Darwin Airport.

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Hazardous wastes created at the ALA are anticipated to be in very small volumes, limited to waste oil or filters only. These will be stored and disposed of in accordance with current mine operating procedures (Hydrocarbons and Hazardous Waste EMP).

ES 4.8 Greenhouse gases

Greenhouse gas emissions were calculated utilising the FullCAM Carbon Accounting Model (AGO 2005) to account for land clearing, construction and operation of the ALA. In addition, greenhouse gas emissions associated with the current alternative of continuing to fly to Pickertaramoor and drive to Andranangoo, as well as helicopter use direct to site, were calculated. Results are summarised below.

- In construction of the ALA, the Runway, Runway Strips and Fly-Over areas will be completely cleared, representing nine hectares. The total greenhouse emissions from this clearing are 1,323 tonnes CO₂^e. The total greenhouse emissions from this partial clearing of Take-off and Landing areas is estimated to be 242 tonnes CO₂^e.
- The total greenhouse gas emissions from ALA construction activities are estimated at 59.6 tonnes CO₂^e.
- The total greenhouse emissions for a return trip from Darwin to Andranangoo ALA are 0.30 tonnes CO₂^e.
- The total greenhouse emissions for a return trip from Darwin to Andranangoo via light aircraft to the existing ALA at Pickertaramoor (and 4WD to the mine site) are 0.42 tonnes CO₂^e, and for helicopter travel to site are 0.60 tonnes CO₂^e.
- Revegetating the ALA site would reduce the greenhouse impact of the project by sequestering CO₂ back into new vegetation. For the purposes of this PER it is assumed that these works will reduce the recovery of the original CO₂^e emissions by 20%. Given that 1,565 tonnes CO₂^e were produced by land clearing, rehabilitation could sequester 1,252 tonnes CO₂^e.
- If the ALA is to be retained by the Tiwi people as a permanent facility, this carbon sequestration would not apply and the greenhouse gas footprint would be equivalent to the construction emissions plus the ongoing emissions from operation of the ALA.

Whole-of-life greenhouse gas emissions from the ALA project can be calculated by adding the following components:

- Construction emissions, including land clearing and operation of machinery;
- Operation emissions; and
- Potentially, the sequestration associated with revegetation of the ALA or alternatively, no rehabilitation, and handover to the Tiwi people in an operational state.

A summary of the whole-of-life carbon footprint is provided in Table ES.2; total emissions are 560 tonnes CO₂^e if the ALA is rehabilitated and 1,812 tonnes CO₂^e if it is not. This level of greenhouse gas emissions can be considered minor in comparison to other infrastructure, forestry, transport and industrial projects in the NT, and around Australia.

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Table ES-2 Whole of life greenhouse gas emissions from the Andranangoo ALA

Project stage	Greenhouse gas emissions (t CO ₂ e)
Vegetation clearing	1,565
Construction	60
Operations **	187
Total with handover to TLC	1,812
Rehabilitation	-1,252
Total with rehabilitation	560

ES 4.9 Biting insects

During the EIS process for Matilda's mining operation, a biting insect survey of the Andranangoo mining area was completed.

With regard to disease risk, two mosquito species are known vectors of Ross River Virus (RRV) and Barmah Forest Virus (BFV), and would primarily pose a risk from November to January, and December to July, respectively. *Culicoides ornatus* is the only biting midge species expected to cause a pest problem at Andranangoo, particularly within two kilometres of the mangrove margin, which is relevant to the ALA area. The highest midge pest problems can be expected from August to November, during the two hours either side of sunset and sunrise.

To minimise the risk of creating new breeding sites at the ALA, appropriate drainage in accordance with the DHCS *Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites* will be constructed and maintained.

It is proposed that the ALA will be constructed during November 2007. Mine personnel and visitors using the ALA will be advised to remain indoors in the mine camp around sunrise and sunset, and during the night to avoid times when pest insect numbers increase. Insect repellent and insect sprays will be provided to all personnel and visitors.

ES 4.10 Socio-economics

The estimated residential population on the Tiwi Islands in 2006 was 2,512 people, of which 92.4% were indigenous and the average age is 26 (ABS 2006). There are three main communities on the Tiwi Islands (Figure ES.1):

- Milikapiti (Melville Island).
- Pirlangimpi (Melville Island); and
- Nguui (Bathurst Island);

In 1999, the TLC assessed the value of the Tiwi economy at M\$25 per year, comprised of M\$11.5 in commercial fishing operations, M\$9.5 from the 'welfare economy' generated by Tiwi people, and M\$4 in enterprise and non-welfare payments. Business enterprises on the Tiwi Islands include forestry, tourism, fishing charters, transport, and arts and crafts. In recent years there have been additional forestry projects proposed, and mineral sands mining and exploration by Matilda Minerals.

The unemployment rate on the Tiwi Islands is high, at three times the NT average, and has risen during recent years. Matilda's Andranangoo mining operation currently employs Tiwi people whenever possible, as well as engaging the Tiwi Rangers in environmental monitoring and the TILG road crews in road maintenance.

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To address the need for further education, the TLC is currently constructing a Tiwi College that will provide quality secondary education to all young Tiwi Islanders at Pickertaramoor that will be owned and operated by the Tiwi Education Board (TLC 2007).

The TLC and Traditional Landowners have stated that they strongly support construction of the ALA and intend to take over the operation and maintenance upon mine closure. The ALA, in conjunction with the mining camp (also an option for the TLC to retain), would provide the necessary infrastructure to allow for business development such as commercial tourism operations at Andranangoo. This would result in a positive socioeconomic impact on the Tiwi people and provide future opportunities for financial independence. The ALA would also continue to provide the economic and health and safety benefits to the Tiwi people including decreased risks and increased ability to meet duty of care.

ES 5 Stakeholder Consultation

The secretary of the TLC (John Hicks) confirmed that 18 minuted meetings were held by the TLC with land owning groups discussing Matilda's mining project, since the first application for exploration leases. All meetings resulted in unanimous support for exploration and sand-mining. Matilda continues to periodically attend TLC meetings to consult with the community and Traditional Landowners.

During preparation of this PER, Matilda conducted comprehensive community consultation with all stakeholders that could be affected by, or have an interest in, the Andranangoo ALA. The objectives of this consultation process were to ensure the interests of those potentially affected by the project were considered and addressed during the environmental assessment process, particularly those of the Traditional landowners. The community, TLC and TILG were supportive of the ALA project.

Consultation with the TLC regarding the proposed ALA was initiated in June 2006, following which the TLC provided Matilda with a letter of support for the proposed ALA in July 2006 (Appendix I). Matilda continued community consultation with the TLC throughout the PER process in the form of two additional formal meetings as well as numerous informal discussions.

Matilda also sent a letter outlining the proposed ALA project and offered a briefing to numerous government departments, local business and identified stakeholders. Most declined the offer of a briefing, as the background paper was sufficient and no further issues were raised.

The following groups did receive briefings on the ALA project from Matilda:

- A government assessments working group, convened by the EPA and including staff from the EPA, DPIFM, DHCS, DPI and NRETA;
- Tiwi Islands Natural Resource Management group;
- TILG;
- Great Southern Plantations;
- The Minister for Natural Resources, Environment and Heritage (Delia Lawrie), in a briefing attended by Matilda's General Manager (Bruce Maluish), Chairman of the TLC (Robert Tipungwuti), and TLC Environmental Manager (Kate Hadden); and
- Verbal consultation was provided to the Tiwi Islands Fishing Lodge by Matilda Environmental Manager Tina Girard.

The Environment Centre of the Northern Territory was unavailable due to being in regional areas on both occasions that Matilda staff was in Darwin however a briefing will be arranged in the near future. Minister Scrymgeour, the local member for the Tiwi Islands, was unable for a meeting.

Several issues were raised by the EPA during the briefing, in particular there was concern over 'community dissent' regarding the project, the area of land and potential for permanent ecological impacts through clearing of the site; EPA requested a robust analysis of alternatives; and expressed concern as to

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whether the TLC's letter of support represented the genuine wishes of the Tiwi Islands land-owning groups.

Matilda has considered and attempted to address all of these concerns in this PER. In order to respond to concerns raised by the EPA, Matilda conducted community meetings on the Tiwi Islands in September 2007 with the TLC, including the Yimpinari people and representatives of the EPA. The EPA was able to observe the complex, but democratic, decision-making processes of the Tiwi people and gain a greater understanding of the system. The TLC continued to demonstrate the strong and unequivocal support for Matilda's ALA project among the 50 TLC representatives present at the meeting, and the enthusiasm of the Tiwi people for projects that deliver economic independence, jobs, training and infrastructure to their area. The TLC raised concerns about the length of time taken in government approvals for the ALA project, and rejected suggestions of community dissent over the project.

ES 6 Management of Aspects and Impacts

ES 6.1 Health, Safety, Environment and Community Management System

Matilda has developed a Health, Safety, Environment and Community Management System (HSEC MS) to assist identification and management of HSEC responsibilities at the Andranangoo mine site, and to allow for continuous improvement of HSEC performance. As the ALA represents a new activity for the mine site, the existing HSEC MS has been reviewed in order to incorporate extra legal obligations, HSEC objectives and targets, monitoring and reporting that relate to construction and operation of the ALA.

ES 6.2 Risk assessment

Potential environmental risks associated with the proposed ALA that require specific management actions were identified based on Australian Standard AS/NZS 4360:2004. Environmental risks were assessed based on both the likelihood and the consequence of a particular impact occurring and compares the results to a risk assessment matrix, providing a qualitative rating of the significance of the risk. For risks that presented a potentially "high" or "significant" rating for the ALA project management controls were developed that include EMP's, procedures or responsibilities to reduce risk to an acceptable level.

ES 6.3 Environmental management plans

Management strategies to reduce potential risks associated with the ALA to acceptable levels have been incorporated into Matilda's existing set of EMP's and procedures for the Andranangoo mining operation. The EMP's relate to individual environmental aspects that could be affected by the Andranangoo mining operation, and s objectives, management actions, monitoring, reporting and legal obligations.

One additional EMP was compiled specifically relating to the construction of the ALA (Aircraft Landing Area Construction EMP), to describe the proposed management of the short-term environmental risks that are only associated with ALA development activities.

ES 7 Commitments

Landform, Soils and Hydrology

Matilda commits to installing stormwater drains and turn-outs along each edge of the Runway at the ALA.

Matilda commits to expanding the existing soil erosion monitoring program to include the ALA.

Matilda commits to implementing existing EMP's for surface water quality, groundwater quality, and hydrocarbons and hazardous substances.

Matilda commits to the storage and handling of hazardous substances in accordance with Australian Standard 1940, and with the Hydrocarbons and Hazardous Substances EMP.

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If rehabilitation of the ALA is preferred at the time of mine closure, Matilda commits to reinstating the natural ground surface, removing surface water drains and other features, and deep ripping and seeding

Flora

Matilda commits to using hand-held GPS units to identify clearing boundaries during construction of the ALA, to avoid accidental over-clearing.

Matilda commits to collecting cleared vegetation during ALA construction into designated areas, to minimise the impact of dumping on the surrounding vegetation. This material would be burnt when dry, or if the ALA is to be rehabilitated after mine closure, the material would remain stockpiled for respreading during rehabilitation.

Matilda commits to including the ALA in the existing vegetation monitoring program, to allow for early detection of weeds in the area. Where weeds are identified, Matilda commits to applying appropriate weed control measures throughout the ALA, camp and mine site, to minimise weed spread and eradicate weeds where possible.

Matilda commits to developing weed identification and awareness training for mine personnel.

Matilda commits to participating in the island-wide weed management program in cooperation with TLC and Great Southern Plantations.

Fauna

Matilda commits to collecting cleared vegetation during ALA construction into designated heaps, to minimise the impact of dumping on the surrounding vegetation.

Matilda commits to installing and monitoring cane toad traps around the perimeter of the ALA.

Matilda commits to including the ALA in the existing feral ant monitoring program.

Archaeology and Heritage

Matilda commit to communicating the possibility of grave sites in the area to mine staff, through the site induction process.

Matilda commits to instructing mine personnel to cease work and contact the Matilda HSEC Officer if a suspected grave site or any archaeological material is observed. The HSEC Officer will contact NRETA Heritage Conservation Services or the TLC for advice, before giving approval for works to proceed.

Air Quality and Noise

Matilda commits to conducting ALA construction during daylight hours only.

Matilda commits to incorporating the ALA into the existing Fire Management Plan, to minimise the risk of large wildfires that could cause intense smoke.

Traffic and Transport

Matilda will impose existing traffic management procedures, such as avoidance of weed infested areas, during ALA construction.

Waste and Hazardous Substances

Matilda commits to applying the management actions included in the existing Waste EMP and Hydrocarbons and Hazardous Waste EMP to the construction and operation of the ALA.

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Matilda will not store any fuel or oil at the ALA site, and only small volumes of fuels or oils required for aircraft for emergency or special circumstances will be stored at the existing bunded facility at the mine site.

Matilda commits to piling vegetation debris and topsoil removed during ALA construction into heaps to minimise impacts to the surrounding vegetation. These heaps would either be burnt or retained for later rehabilitation of the ALA, should the decision be made during the PER process to remove the ALA after completion of mining.

Greenhouse Gases

Matilda commits to using hand-held GPS units to identify clearing boundaries during construction of the ALA, to avoid accidental over-clearing.

Matilda commits to coordinating flight schedules as efficiently as possible to minimise the number of flights per week, and to utilise larger planes that are more efficient in “per passenger” fuel use.

Matilda has joined the Greenhouse Challenge and commits to continuing to reduce greenhouse emissions where possible.

Biting Insects

Matilda commits to constructing the ALA in accordance with the DHCS Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites.

Matilda commits to continuing to provide advice on biting insect risks and personal protective equipment (such as insect repellent) to all mine personnel and visitors.

Socio-Economic

Matilda commits to continuing a close working relationship with the TLC, to identify opportunities to contribute positively to the Tiwi Islands’ economy and society.

Matilda commits to leaving the ALA in sound operational conditions at the end of mining, should it be confirmed as a result of this PER process that the ALA should remain as a future asset to the Tiwi Islands community.

Stakeholder Consultation

Matilda commits to continuing stakeholder consultation throughout the PER public review period for the ALA project.

Matilda commits to maintaining open and regular communication with the TLC and relevant land-owning groups throughout the construction, operation and rehabilitation phase of the ALA and the Andranangoo mining project.

Risk Assessment

Matilda will continue to systematically evaluate the HSEC risks associated with the proposed ALA through the construction, operation and maintenance phases of the project. These will be documented in the site HSEC Aspects and Impacts Register.

Matilda will implement management actions for the ALA as detailed in Table 15.4, including EMP's and other procedures.

Section 1

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1.1 The Proposal

The objectives of this Public Environmental Report (PER) are to;

- describe the proposed development;
- present an evaluation of alternatives;
- identify and assess the potential impacts as a result of the construction and operation of the proposed ALA; and
- provide a description of management strategies to mitigate those impacts.

Assessed impacts of the ALA construction and operation encompass the natural, social and economic environment, and are discussed in the context of the project.

The PER also includes reference to relevant components of Matilda's existing Health, Safety, Environment and Community Management System (HSEC MS), and Environmental Management Plans (EMP's) demonstrating Matilda's proposed management of the environmental issues relevant to the ALA project on an on-going basis.

Matilda has consulted with the Tiwi Land Council (TLC), Traditional Owners, the Tiwi Island Local Government (TILG) and the local community during the planning stages of this proposal, and these groups have indicated strong support for the development of the ALA. Details of this consultation process are provided in Section 14.

Complete background information on Matilda's mineral sands mining operations at Andranangoo and Lethbridge Bay West are provided in the Draft Environmental Impact Statement (EIS) (URS 2006a) and EIS Supplement (URS 2006b), submitted to the NT Government in February 2006.

1.2 Proponent Details

Matilda Minerals Limited

45 Richardson Street, West Perth WA
(PO Box 124, West Perth WA 6872)

Contact: Bruce Maluish, Managing Director
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Email: bruce.maluish@matildaminerals.com

1.3 Project Name and Location

Project Name: Proposed Construction and Operation of Aircraft Landing Area, Andranangoo Creek West

Project Location: Melville Island, Tiwi Islands, Northern Territory

The Tiwi Islands are located 60 km north of Darwin, NT, Australia (Figure 1.1). The islands cover 7,900 km² and have a permanent population of approximately 2,500 people.

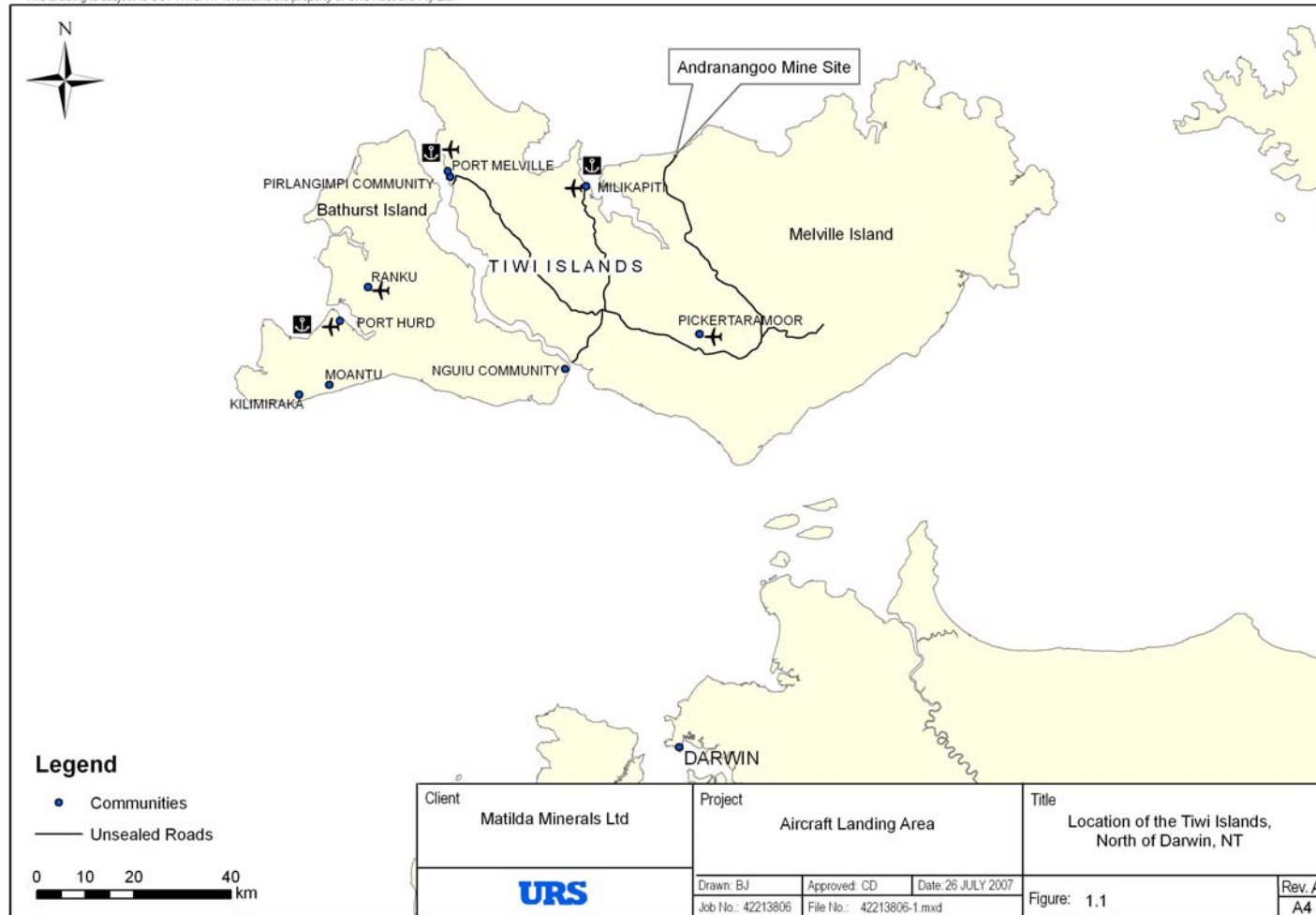
Matilda received approval for the Andranangoo mining project in July 2006, and commenced operations in October 2006. The mine site and proposed ALA are located on the northern side of Melville Island.

The Andranangoo mineral sands operation is currently serviced by the existing airstrips on Melville Island. These airstrips are located at Pickertaramoor, Pirlangimpi (Garden Point) and Milikapiti (Snake Bay) ranging in distance from the site between approximately 60 and 130 kilometres by road.

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1.4 Project Justification, Objectives, and Benefits

During the 2006-2007 wet season road conditions between the Andranangoo mine site and existing airstrips on Melville Island deteriorated quickly under high intensity rainfall events, which varied spatially and temporally across the island, making planning difficult. The poorer road conditions sometimes increased the driving time for a one-way trip to Pickertaramoor from one hour to three hours.

The mine access roads were completely impassable by light vehicles for one month, and impassable by heavy vehicles for three months during the 2006-2007 wet season. During this time personnel and supplies were transported to site via helicopter. Extreme rainfall also rendered the Pickertaramoor airstrip unsuitable for landing light aircraft, as poor road access to the airstrip limited maintenance of the runway surface. Matilda was therefore required to utilise sealed airstrips located at greater distances, and travel times, from Andranangoo.

Furthermore, during the course of business planning Matilda was advised that the NT Aerial Medical Service (AMS) had access to a dedicated medivac helicopter. However, while planning emergency response during the first year of operations, it was confirmed that NT AMS do not have dedicated access to helicopters and cannot guarantee being able to charter one if required.

Matilda proposes to construct an ALA to satisfy the objectives of managing and reducing the health, safety and environmental risks associated with the Andranangoo operation. This will be achieved through operation of an ALA adjacent to the mine site resulting in the following benefits:

- Improved safety by allowing rapid evacuation of personnel and visitors in the event of a cyclone or medical emergency;
- Reduced likelihood of health and safety risks (worker fatigue) by decreasing travel time to the site for staff and visitors;
- Reduced environmental, health and safety risks by reducing the need to travel by road during the wet season when water levels are high and road conditions are unsuitable for driving; and
- Reduced risk of spreading weeds by eliminating the need to drive through weed-infested areas near Pickertaramoor (the primary airstrip currently being used).

After closure of the Andranangoo mine site, the TLC and Traditional Owners will have the opportunity to acquire and operate the ALA. A similar arrangement has already been approved for the existing mine camp facilities.

Consultation with the TLC and Traditional Landowners has indicated support for the project and it is considered that the ALA will provide a lasting asset to the Tiwi people, providing future business opportunities for tourism and other potential developments through improved access to the area. Should the Tiwi people retain the ALA, the primary health, safety and environmental benefits listed above would continue to apply, in addition to the potential long-term socio-economic benefits.

If the Tiwi people do not want to accept liability for the ALA upon mine closure, Matilda will rehabilitate as per the current mining area.

1.5 Project Alternatives

A range of alternatives for transport of personnel and goods to the Andranangoo mine site have been considered by Matilda. These are described in detail in Section 3, and are summarised as follows:

- Direct flights to Andranangoo utilising the proposed ALA, and the option for the Tiwi people to retain the ALA after mining;
- Direct flights to Andranangoo utilising the proposed ALA, with rehabilitation after mining;
- Flights to existing ALA's and road transport to Andranangoo ('do nothing' option);

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- Helicopter flights to Andranangoo;
- Boat travel to Andranangoo; and
- Sea plane travel to Andranangoo.

1.6 Environmental Assessment Process

1.6.1 Northern Territory

This PER has been prepared in accordance with the requirements of the NT *Environmental Assessment Act* and the Environmental Assessment Administrative Procedures under which the Act is implemented.

In 2006, Matilda Minerals submitted an EIS to the NT Government for the mineral sands mining project at Andranangoo and Lethbridge Bay West. Approval for the mining project was granted in July 2006, and mining began in October 2006.

Matilda first presented the proposal to construct an ALA at Andranangoo in the form of an Amendment to their Mine Management Plan (MMP). This document served as initial notification to the NT Government for the ALA project.

The environmental assessment process for the ALA proposal is as follows:

- 1) **Initial Notification.** An Amendment to Matilda's MMP was submitted to the NT Department of Primary Industry, Fisheries and Mines (DPIFM) on December 15th, 2006. The MMP Amendment outlined the proposed construction and operation of the ALA, and was referred by DPIFM to the NT Environment Protection Agency Program (EPA).
- 2) **Determination of Level of Assessment.** There are two levels of formal assessment defined under the NT assessment process; a PER may be required to assist in assessing environmental impacts that are considered significant but limited in extent, while an EIS may be required to assess environmental impacts that are considered more significant or extensive. On March 28th, 2007 the Minister for Natural Resources, the Environment and Heritage (Minister) informed Matilda that the level of assessment for the proposed ALA would be a PER, citing environmental issues of concern.
- 3) **Public Review of Guidelines.** The information within Matilda's MMP Amendment, and consultation with relevant agencies, assisted the EPA in preparing PER Guidelines outlining issues to be addressed during the environmental assessment process. Draft Guidelines were released for public comment on June 4th, 2007, for a 14 day public comment period. In July 2007, Final Guidelines were issued taking into account comments received from the community and Government agencies. The PER Guidelines are presented in Appendix A.
- 4) **Preparation of the PER.** This PER was prepared between July and October 2007 in accordance with the PER Guidelines. It contains information already gathered by Matilda during MMP preparation and during the continuing operational phase of the mine, and extra data gathered to fulfil the requirements of the PER Guidelines.
- 5) **Submission of the PER and Public Review.** The PER has now been released for review to enable the public and government agencies to comment on the project. Details on display centres, submission procedures, and purchasing details have been advertised in local newspapers. During the public review period comments can be submitted to the EPA.
- 6) **Government Review and Decision.** At the close of the public review period, the Minister has 14 days in which to make a determination about the proposal. This decision is based upon the contents of the PER, issues raised in any comments received and advice from the various advisory bodies. The Minister's determination will be included in an Assessment Report, which also includes any suggestions or recommendations concerning conditions which should apply to the project, to minimise potential environmental impacts. The Assessment Report will be forwarded to the Minister for Mines and Energy for consideration.

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- 7) **Mining Approval.** As the project is associated with a mining activity, approval may be given by the Minister for Mines and Energy under the *Mining Management Act 2001*. Management actions will be incorporated into Matilda's existing MMP.

1.6.2 Commonwealth

In addition to the PER procedures of the NT Government, under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) developments require assessment if they have the potential to affect one or more of the seven Matters of National Environmental Significance (MNES), namely:

- World Heritage properties;
- National heritage places;
- Ramsar wetlands of international significance;
- Threatened species and ecological communities;
- Migratory species;
- Commonwealth marine area; and
- Nuclear actions (including uranium mining).

A referral under the EPBC Act was prepared and recently submitted to the Commonwealth Department of Environment and Water Resources (DEW) in relation to Matilda's proposed ALA (the referral form is provided in Appendix B). A decision on whether the project constitutes a controlled action was pending at the time of completing this PER.

1.6.3 Bilateral Agreement

For actions that are controlled under the EPBC Act, the terms of assessment are considered on a case by case basis under the Bilateral Agreement between the Commonwealth and the NT Government. Once assessment is completed to the satisfaction of the NT Minister, the NT EPA will report its findings to DEW, who will then advise of their final decision within 30 business days of submission of the EPA's recommendations.

1.7 Relevant Legislation and Policies

Beyond the NT *Environmental Assessment Act* and the EPBC Act there are a number of other items of legislation and policies that may be relevant to the proposed ALA construction project.

In particular, the federal regulatory authority for construction and operation of airstrips is the Civil Aviation Safety Authority (CASA), who administers the *Civil Aviation Act* and the *Civil Aviation Regulations* (CAR).

There is no requirement for CASA to sanction the establishment of an ALA if it is intended only for private transportation and charter operations, by an aircraft with a maximum take-off weight of 5,700 kg (a nine-seater aircraft). Under Civil Aviation Regulation 92, it is the responsibility of the pilot to determine whether an ALA is suitable for the landing and taking-off of aircraft. CASA's Civil Aviation Advisory Publication (CAAP) No 92-1(1) sets down guidelines for pilots to determine the suitability of an ALA within specific parameters.

The following additional legislation and policies may be relevant to construction and operation of the ALA at Andranangoo:

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Northern Territory Legislation

- *Bushfires Act*
- *Dangerous Goods Act*
- *Fire and Emergency Act*
- *Heritage Conservation Act*
- *Litter Act*
- *Local Government Act*
- *Mining Management Act 2001*
- *Northern Territory Aboriginal Sacred Sites Act*
- *Planning Act*
- *Public Health Act*
- *Radiation (Safety Control) Act*
- *Soil Conservation and Land Utilisation Act*
- *Territory Parks and Wildlife Conservation Act*
- *Traffic Act*
- *Waste Management and Pollution Control Act*
- *Water Act*
- *Water Supply and Sewerage Act*
- *Weeds Management Act 2001*
- *Work Health Act*
- *Motor Vehicles (Standards) Regulations*

Commonwealth Legislation and Policies

- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)*
- *Aboriginal Land Rights (Northern Territory) Act 1976 (Cth)*
- *Industrial Chemicals (Notification and Assessment) Act 1989 (Cth)*
- *Native Title Act 1993 (Cth)*
- National Environment Protection (*Assessment of Contaminated Site*) Measure 1999
- National Strategy for the Conservation of Australian Species and Communities Threatened with Extinction
- National Strategy for the Conservation of Australia's Biological Diversity 1996

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1.8 PER Structure

This PER is submitted for public review in a structure that addresses the PER Guidelines prepared by the NT EPA (Appendix A) and allows for easy interpretation of the issues and impacts that have been identified for the ALA. The PER is set out as follows:

Executive summary

The Executive Summary provides a brief overview of the project, its potential environmental and social effects, and the proposed mitigation strategies.

Introduction

This section identifies the proponent, provides an introduction to the project location and the objectives of the project. It includes a brief description of the alternatives considered during the project planning phases, and a description of the NT and Commonwealth environmental approvals processes under which the proposal will be assessed. This section also details other legislation and policies that may be relevant to the project.

Project description

This section provides a detailed description of the ALA project, including construction, operation, maintenance and handover upon mine closure at Andranangoo.

Alternatives

This section presents an assessment of alternative transportation options in terms of the following criteria:

- Environmental best practice – the level of environmental protection, and the environmental costs or benefits incurred;
- Cost-effectiveness – the costs of implementation, when compared with the level of environmental protection achieved by that option;
- Practicality and effectiveness – how that option contributes to efficiencies in the associated business;
- Maintenance and liability – the age of any equipment or facility employed may affect its integrity and contribute to a higher environmental risk. Environmental protection measures that require ongoing maintenance or upgrades would score lower in this criteria; and
- Social factors – consideration of the views of the regional community. For example, a technology that improves the level of environmental protection may also have negative social consequences, in terms of employment or access to recreation by the local community.

Description of existing environment and potential impacts

Sections 4, 5, 6 and 7 provide a description of the existing environment in the vicinity of the project area in terms of Landform, Soils and Hydrology; Flora; Fauna; and Archaeology, respectively. Aspects considered include climate, land systems, surface water, groundwater, soils, flora, fauna, archaeology and heritage. Within these sections, the potential environmental impacts of the ALA project are discussed, and Matilda's proposed management measures to minimise negative impacts are described.

Additionally, potential impacts to the following conditions are evaluated in Sections 8 through 13, respectively: Air Quality and Noise; Traffic and Transport; Waste and Hazardous Substances; Greenhouse Gas Emissions; Biting Insects; and Socio-economic.

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Stakeholder Consultation

The stakeholder consultation process undertaken prior to and during the development of the PER is described in detail in Section 14. All issues raised by the community, and Matilda's responses to these issues, are provided in tabular form.

Risk assessment

Section 15 provides a preliminary environmental risk assessment of the proposed ALA construction and operation. It addresses the environmental issues in context to ensure they are considered based upon their significance and priority. The risk assessment methodology used is based on the requirements of the Australian Standard AS/NZS 4360:2004 for Risk Management.

The outputs of the risk assessment are presented in tabular form and are incorporated into the ALA EMP's detailed in Section 17.

Health, Safety, Environment and Community Management System and Plans

Section 16 outlines Matilda's existing HSEC MS, and describes how management of the ALA project will be incorporated into the HSEC MS.

The HSEC MS has been developed based on the Australian Standards AS/NZ ISO14001 for Environmental Management Systems, and AS/NZS 4801 for Health and Safety Management Systems. It includes a series of EMP's that address issues assessed as being significant during the risk assessment process. Existing EMP's manage impacts associated with the mining and processing of mineral sands and have been reviewed to include the potential impacts and issues associated with the ALA.

The EMP's include on-going actions, regular monitoring, reporting responsibilities and relevant legislation and policies, and are presented in Section 17.

Commitments

Matilda's commitments pertaining to the proposed ALA are detailed throughout the document where relevant, and are provided as a summary in Section 18.

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Description of Proposal

2.1 Project Location

The Andranangoo mining lease is located on the northern coast of Melville Island. The proposed ALA is to be constructed parallel to the existing access road to the mine site (Figure 2.1).

The site for the proposed ALA is on laterite escarpment, approximately one kilometre from the beach and 900 metres west of Andranangoo wetland.

2.2 Land Tenure

The land on which the mine site and the proposed ALA are located is Aboriginal land, traditionally owned by the Yimpinari group. The Yimpinari are one of eight Traditional Owner groups on the Tiwi Islands, and hold the largest area of land (TLC, 2004).

The ALA is located partly on mining lease MLA 24510, and partly on exploration lease EL 23862, both of which are held by Matilda.

The TLC and Traditional Owners have expressed unequivocal support for the proposed ALA project from project initiation in 2006, and throughout the community consultation process (see Section 14). The Traditional Owners have confirmed that there are no Aboriginal sacred sites located within the proposed ALA, which has been granted a clearance certificate from the Aboriginal Protection Areas Authority (AAPA) (see Section 7). There are no additional land tenure permits required for construction of the proposed ALA.

2.3 Construction Details

2.3.1 ALA design

The ALA has been designed according to the dimensions and requirements specified in the Civil Aviation Advisory Publication (CAAP) No 92-1(1), as recommended by CASA (Figure 2.2). Matilda consulted with CASA Darwin and with an Aerodrome Consultant (Aerodrome Services NT Pty Ltd), prior to finalising the ALA design to ensure that the correct orientation, lengths, surface construction and safety considerations were applied.

The main Runway is 15 metres wide, bordered by a Runway Strip (15 metre width) and a Fly-Over Area (7.5 metre width) along each side; a total of nine hectares in total. These areas will be cleared of all vegetation and surfaced with compacted gravel.

At each end of the Runway, an Approach and Take-Off Area will be maintained to provide aircraft with safe access to the Runway while flying low over the surrounding forest. Tall vegetation will be pruned in these areas, on a slope of 3.3% from the ends of the Runway.

CASA recommends that Approach and Take-Off Areas should extend to a maximum length of 900 metres from the Runway, with a maximum width of 150 metres, depending on vegetation height and topography. As the maximum vegetation height in the project area is approximately 20 metres (Metcalf 2007a), partial clearing of tall trees and shrubs will only need to extend to a maximum of 400 metres from the Runway ends, after this point, the tree height will be below the 3.3% slope line. The area affected by this partial clearing will be approximately 4.3 hectares at each end (8.6 hectares in total).

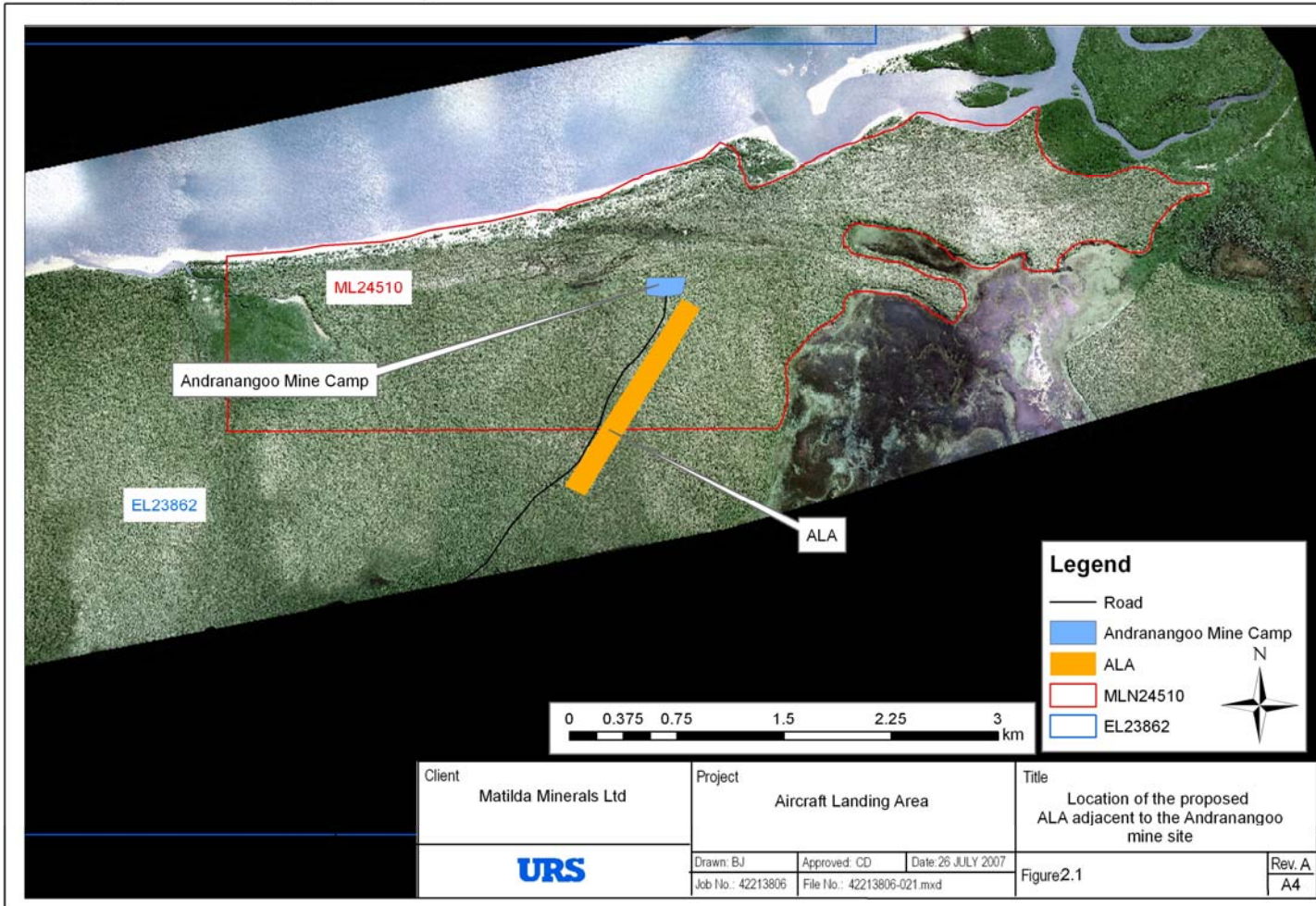
Therefore the total disturbance area for the ALA is nine hectares of land clearing, and 7.4 hectares of "partial clearing", for a total area of 16.4 hectares.

Although not mandatory under CAAP No 92-1(1), standard aerodrome markings will be installed at the ALA to facilitate safe landing and take-off.

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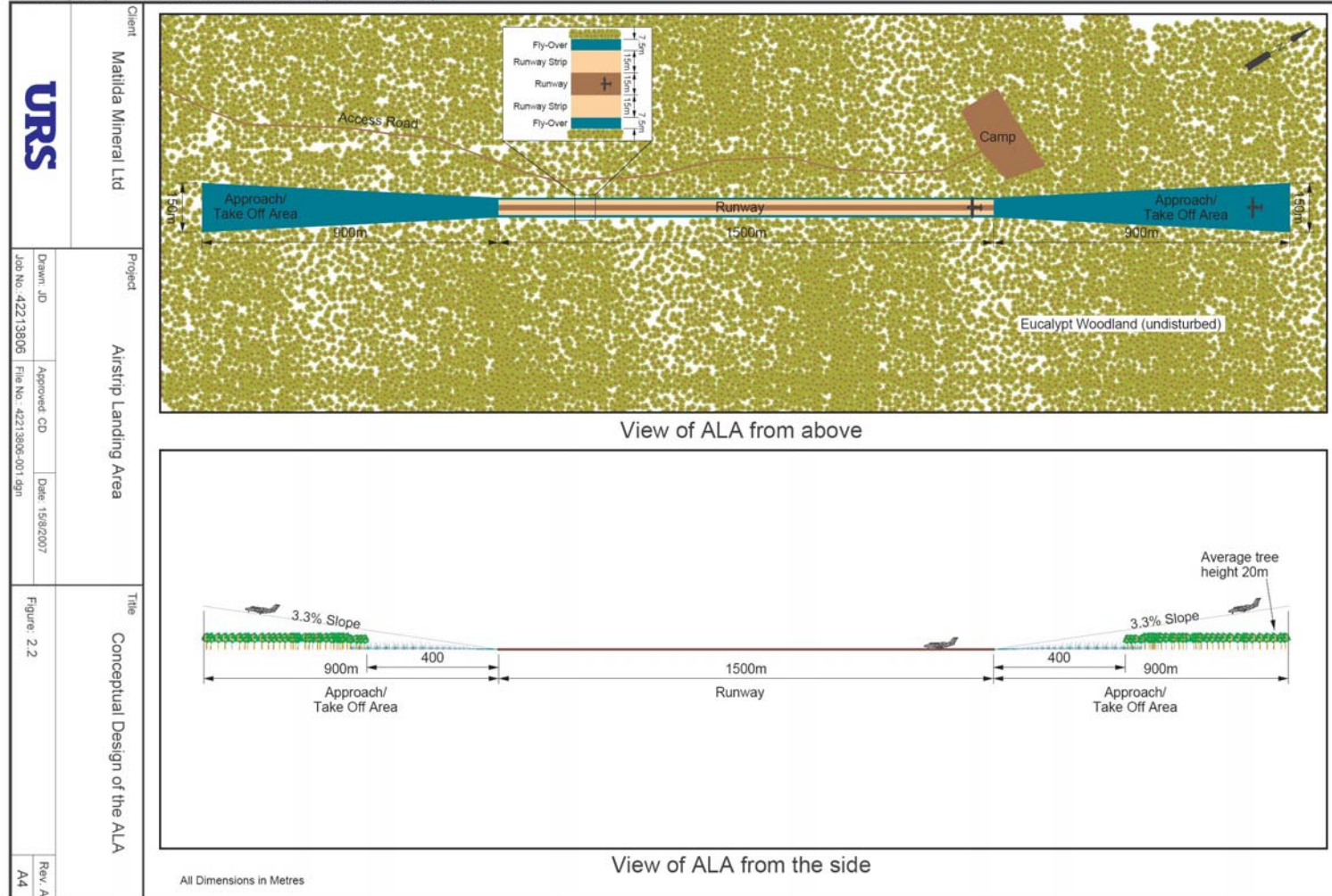
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2.3.2 Site preparation

The proposed ALA site will be cleared of vegetation using bulldozers and earthmoving machinery that is currently in use at Matilda's mine site. Tree trunks and debris will be piled in two or three designated areas and burnt. However, if rehabilitation of the ALA is preferred, as identified in the consultation and PER process, the cleared vegetation would remain stockpiled for re-spreading during rehabilitation.

There are a number of cycads (*Cycas armstrongii*) in the area of vegetation to be cleared (see Section 6 Flora for more details), and Matilda has been issued with a *Permit to Take Wildlife for Commercial Purposes* to remove this species, from NT Parks and Wildlife, Department of Natural Resources, Environment and the Arts (NRETA). Cycads removed will be tagged, documented and provided to the local Tiwi community, for sale to collectors and nurseries, generating an income for the TLC.

2.3.3 Construction

The Runway will be levelled using a grader. The natural surface will be windrowed, moistened, respread and compacted with a heavy roller, using water sourced from the existing production bores at the mine site. Given the nature of the location of the proposed ALA and Matilda's experience with road maintenance, additional gravel is not anticipated to be required. Excavation and compaction will be minimised so as to provide for easier rehabilitation of the site, if required either by Matilda after closure of the mine, or by the TLC at a later date.

Surface water drains will be formed by a grader along the edges of the Runway Strips to collect stormwater runoff, which would be directed at non-scouring velocities, using turn-outs, into the surrounding vegetation.

In addition to the Runway and associated cleared areas, a short access track (less than 100 metres) will be installed to link the ALA with the existing road to the mine site.

Although not mandatory under CAAP no 92-1 (1), standard aerodrome markings will be installed, to facilitate safe landing and take-off. A wind sock will be installed at one end of the Runway.

There will be no sheds or fences constructed at the ALA site.

Minimal water will be required to wet down the area during construction, to assist with compaction and for dust suppression. Water will be sourced from the existing water supply bore next to the Andranangoo haul road, and transferred to ALA site using the existing water cart. Water usage will be minimised to avoid runoff.

Shrubs and small trees in the Fly-Over areas (shown in Figure 2.2) will be pruned down to the required height using a dozer with the blade above ground. Large trees will be pushed over and left on the ground.

Matilda will implement the ALA Construction Environmental Management Plan as detailed in Section 17.1.

2.3.4 Project schedule and contracting

Matilda proposes to construct the ALA as soon as possible, so as to secure access to the mine site over the wet season of 2007-2008. Government approvals pending, construction is planned to begin in November 2007.

It is anticipated that construction of the ALA will take up to four weeks.

Matilda regularly contracts the TILG to complete road repair works along the haul road to the mine site. Where possible (when promptly available and suitably equipped), Matilda will contract the TILG to assist with construction of the ALA.

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While Matilda anticipates that the ALA construction project will be entirely undertaken by mine staff and the TILG, additional contractors may be engaged if required to complete construction prior to the 2007-2008 wet season.

Staff employed to complete site preparation and construction of the ALA will be housed at the existing mining camp, and no additional infrastructure will be required. Domestic waste, anticipated to be minimal due to the short construction time, will be disposed of at the existing facilities.

2.4 Maintenance

After construction, activities required to maintain the ALA will mainly relate to the condition of the gravel surface. Heavy rains during the wet season may result in some rivulets forming, although the ALA will be designed to minimise erosion risks and direct surface water flows away from the Runway as much as possible. Surface water drains and turn-outs at the edge of the Runway may need to be re-sculpted on an annual basis after the wet season.

Matilda would use existing machinery and personnel from the mine site to carry out this maintenance work. If particular machinery is required and is not readily available at the mine site (such as a roller), Matilda will engage the TILG to assist where possible.

As described in Section 9, the TILG currently manages four airstrips on Melville and Bathurst Island (Ranku, Nguiu, Milikapiti and Pirlangimpi), as well as an extensive road network. All maintenance is conducted by the TILG, who have experienced personnel and operating procedures, and sufficient capacity to manage the Andranangoo ALA when it is handed over to the Tiwi people after mine closure.

Additional unsealed ALA's on the Tiwi Islands include Maxwell Creek and Rolla Plains (maintained by Great Southern Plantations), Pickertaramoor (maintained by the TLC and soon to be upgraded as part of the Tiwi College) and Port Hurd (maintained by the TLC) (see Section 9.1.2). These eight airstrips demonstrate an ongoing (historical) capacity to manage ALA's outside of the main communities.

Any seedlings and saplings that germinate through the Runway surface will be removed periodically. Weeds will also be monitored and controlled. Matilda's mine personnel would carry out these activities, guided by the site HSEC Officer.

Environmental monitoring for the ALA site has been integrated into the existing programs for the Andranangoo mine site; Section 17 presents further information on these.

2.5 Operation of the ALA

It is proposed that the ALA would be used by Matilda for charter aircraft from Darwin. The ALA will be suitable for single or twin-engine aircraft with a maximum take-off weight of 5.7 tonnes (nine-seater aircraft, or smaller). These aircraft will transport personnel, visitors and supplies directly to the mine site, typically three to five times per week.

According to CASA, there is no requirement to sanction the establishment of an ALA that is intended only for private transportation and charter operations by small aircraft (take-off weight 5.7 tonnes or less). Under Civil Aviation Regulation 92, it is the responsibility of the pilot to determine whether the ALA is suitable for landing and take-off of aircraft.

CAAP No 92-1(1) sets down guidelines for pilots to determine the suitability of the ALA, with parameters including:

- Physical characteristics (including Runway width, length, longitudinal slope and transverse slope);
- Geographic location;
- Runway surface; and
- Markers and lighting.

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As mentioned in Section 2.3.1, the Andranangoo ALA has been designed according to these parameters, and in consultation with CASA and Aerodrome Services NT, to ensure that the ALA is suitable for small aircraft.

2.6 Post-Mining Operation of the ALA

Matilda anticipates completing mining operations at Andranangoo by 2010. Following completion of mining the Traditional Owners will have the option to retain the mining camp, as discussed in the EIS (URS 2006a). Matilda proposes that in addition, the Traditional Owners also have the option to retain the ALA for use by the local community.

The TLC and Traditional Owners have expressed support for the proposed ALA project and the desire to retain the ALA post-mining (see Section 14). The Andranangoo mine camp and ALA could represent a significant asset for the Tiwi people, with potential development of a new business venture such as a tourist fishing camp. The ALA would provide easy access to the area, reducing the need for tourists to stay overnight, and would provide the environmental, health and safety benefits detailed in Section 1.4. The socio-economic impacts of the ALA are discussed in Section 13.

If, upon completion of mining activities, the Tiwi people do not wish to retain the operations and maintenance of the ALA, Matilda will deep rip, seed and rehabilitate the area, similar to the mining camp.

Both post-mining management options are detailed briefly below.

2.6.1 Retention of the ALA

The Tiwi people have indicated their desire to retain the ALA after completion of mining at Andranangoo. The capacity of the TILG to provide maintenance for the facility is described in Section 2.4.

Ongoing management of the ALA may consist of:

- maintenance of gravel surface and compaction when required;
- weed management;
- prompt removal of seedlings and saplings that germinate on the Runway surface; and
- maintenance of surface water drains.

The TILG and TLC have extensive experience in managing the ongoing operation and maintenance of ALA's, and carry out annual business planning meetings where these activities could be included.

As requested in the PER Guidelines (Appendix A), Matilda has estimated the cost of ALA maintenance for a duration of 5 years at \$28,000 (\$5,600 per year).

2.6.2 Rehabilitation of the ALA

If the Tiwi people do not wish to retain the proposed ALA, Matilda will deep rip, seed and rehabilitate the area in accordance with the rehabilitation practices in place for the Andranangoo mine site. Key rehabilitation measures are summarised below, and are detailed in the EIS (URS 2006a) and MMP (Matilda 2007):

- Cleared vegetation will remain stockpiled for re-spreading during rehabilitation;
- Topsoil to a depth of 50 millimetres will be piled into a separate stockpile, for later spreading and use as a brush cover and seed bank in rehabilitation;
- When the ALA is decommissioned, the compacted area will be deep ripped and seeded;
- Flora monitoring data will be undertaken on rehabilitated areas to identify any species deficiencies. If required, revegetation with seedling stock will be carried out using species identified during baseline

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surveys (provided in Appendix D). Seed would be collected from the surrounding area to ensure that flora provenance is preserved. Matilda has obtained a permit through NRETA for seed collection;

- Old logs stockpiled during clearing will be returned to rehabilitated areas to facilitate recolonisation by local flora and fauna (including birds), and to provide additional protection from wind and water erosion; and
- Areas susceptible to erosion will be covered with brush and seeded.

Overall the rehabilitation program will focus on returning native vegetation endemic to the area wherever possible. Key flora species will be identified and targeted for recolonisation where appropriate. Completion criteria will be established for percentage plant cover, based on baseline data.

Matilda's rehabilitation activities focus on five key objectives as follows:

- To minimise the area of land cleared or disturbed at any point, and to progressively rehabilitate mined areas as soon as practicably possible;
- To ensure that the post-mining landform is consistent with the pre-mining landform and surrounding undisturbed areas wherever possible;
- To stabilise disturbed areas as soon as practically possible to prevent wind and water erosion;
- To revegetate the stabilised post-mining landform to provide for the long-term stability of the system, and for the return of native flora and fauna communities that are similar to pre-mining conditions and surrounding undisturbed areas; and
- To ensure sufficient resources are made available to maintain mine-site rehabilitation and monitoring works in the longer term, that is, up to 20 years if required, to allow for setbacks (e.g. cyclones) and slower than expected progress in the rehabilitation.

Rehabilitation and Mine Closure Plan

A Rehabilitation and Mine Closure Plan (RMCP) has not yet been formalised for the Andranangoo mine site, and will be developed in consultation with the TLC, Traditional Owners and DPIFM, over the next twelve months. If required, the ALA will be incorporated into this RMCP.

The RMCP will include rehabilitation objectives, completion criteria, and reference to specific rehabilitation, closure and relinquishment procedures. The RMCP will also include provisions and procedures for on-going monitoring and maintenance, as well as contingency requirements in the event of rehabilitation failure. The RMCP will reference the Tiwi Islands Regional Natural Resource Management Strategy (TLC 2004), with regard to ongoing management of fire, weeds, feral animals and erosion that may potentially occur as a result of Matilda's mining activities.

Rehabilitation security bond

The factors that Matilda must consider to calculate rehabilitation security bonds are not static, and will be reviewed regularly to ensure that they reflect changes in legislation, Government policy, community expectations and technological advancements. Securities are reviewed on an annual basis as part of the process of reviewing the annual MMP, or when significant changes occur to operations, to ensure that they reflect current mining activities.

In the future, the calculations of securities will be based on the detailed plans specified in the RMCP and documented in the annual MMP.

The costs per hectare for rehabilitation and the resulting annual security provisions are presented in Tables 2.1 and 2.2 respectively. According to the PER Guidelines (Appendix A), Matilda has calculated these for a five year period.

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Table 2-1 Costs per hectare to full rehabilitation, at each stage of rehabilitation

Rehabilitation stage	Excavator Refilling	Dozer Reshaping	Dozer Spreading	Seeding	TOTAL
Cleared Land; Years 1 to 3 Operational ALA, totally cleared and compacted, with stockpiled topsoil and vegetation	\$3,000	\$2,000	\$1,000	\$1,000	\$7000
Mine Rehab Stage 1; Approx Year 4 ALA reshaped to previous landform, topsoil replaced and vegetation re-spread	\$0	\$0	\$1,000	\$1,000	\$2000
Mine Rehab Stage 2; Years 5 to 8 Successful regeneration of suite of species	\$0	\$0	\$0	\$1,000	\$1000
Mine Rehab Stage 3; Years 7 to 10 Completed rehabilitation subject to audit, mature regrowth	\$0	\$0	\$0	\$0	\$0

Table 2-2 Proposed rehabilitation security provisions for the ALA (for 9 hectares of cleared land)

Year	Rehabilitation Cost
ALA operation 2007-2010; Years 1-3	\$63,000
Rehabilitation once decommissioned, approximately Year 4	\$18,000
Years 5 to 10 (EPA Request)	Max. \$9,000

2.7 Surface Water Management

The Andranangoo area receives high levels of rainfall throughout the wet season, therefore management of surface water to minimise erosion is critical to maintain a usable Runway. During construction, drains will be formed along the edges of the hard-pan Runway Strips using a grader. These drains will collect sheet water flow from the Runway surface, and turn-outs will direct run-off into the surrounding vegetated areas. These drains will also collect any sedimentation in surface water flows.

Maintenance for these drains is likely to involve correction of any scouring if required. Any soils deposited in the drains may be used to reconstruct the drains or turn-outs.

The proposed ALA is located approximately 900 metres from the Andranangoo swamp and one kilometre from the beach, at an elevation of approximately 15 meters. No impacts of sedimentation or pollution of these water bodies from the ALA is expected. Section 5 contains more details on surface water management.

2.8 Transport

Current methods of transport to the Andranangoo mine site were first presented in the EIS (URS 2006a).

Routine travel for mine personnel currently occurs three to five times per week, and consists of light aircraft flights to Pickertaramoor ALA primarily and when required, Pirlangimpi ALA (Garden Point) or Milikapiti ALA (Snake Bay), and road transport across the island to the mine site (Figure 1.1). Travel time between Andranangoo and these existing ALA's is between two and half and six hours for a round trip, depending upon location and road conditions.

The proposed Andranangoo ALA provides an additional transport facility to Melville Island, which will add to the existing network of roads, ALA's and barge landing sites. Construction of the ALA will enable Matilda's mine personnel, subcontractors and visitors to fly directly to the mine site from Darwin, during routine travel.

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The ALA will also provide a new emergency transport facility, for light aircraft evacuation during medical emergencies or evacuations. Helicopter evacuation direct to the mine site is currently an unavailable option, in the event of an emergency (see Section 3.3). An ALA at Andranangoo would allow transport from Darwin to the mine site to be more reliable, at a sustainable business cost and over a shorter time period.

Bulk goods required at the mine site, such as fuels and machinery, and non-perishable camp supplies will continue to be transported by barge service to Garden Point and transported to Andranangoo by road. As perishable camp supplies are currently transported by air to existing ALA's, construction of an ALA at Andranangoo would facilitate more efficient transportation of perishables to site.

Haulage of mineral sands concentrate from Matilda's operations will continue to be conducted via road to Port Melville.

Construction of an ALA at Andranangoo does not require any road building, and given the small scale of the project, Matilda does not anticipate that this will result in increased transportation requirements on the island.

A discussion on the various alternative transport systems available to Matilda is provided in Section 3. Further information on the traffic and transport impacts of the ALA project are provided in Section 9.

2.9 Waste Management

Waste streams created at the ALA may include small amounts of domestic waste which will be collected and disposed of in the existing landfill area at the mine site. Waste inside the landfill site is periodically burnt and covered with earth to discourage birds and animal access. No additional waste (beyond vegetation matter and domestic waste) is anticipated to be generated as a result of construction of the proposed ALA.

Waste management is discussed in more detail in Section 10.

2.10 Hazardous Substances

No fuel storage facilities are planned for the Andranangoo ALA site. It will be the responsibility of the charter aircraft operator to complete refuelling at Darwin Airport prior to travelling to the island.

For exceptional circumstances where refuelling is necessary, such as for emergency use or when light aircraft are used in exploration activities for two or more consecutive days, small volumes of aviation fuel (e.g. two or three 205 litre drums) will be stored on the existing fuel storage bund at the mine site in compliance with Matilda's Hydrocarbon and Hazardous Substances EMP, and AS 1940.

Maintenance of aircraft (and any other machinery) is not intended to be carried out at the ALA, and no waste oil will be generated at the ALA.

Further details on the management of hazardous substances are provided in Section 10.

2.11 Employment

As the ALA construction project is short in duration and relatively small in scale, it is unlikely to create significant new employment opportunities. As stated in Section 2.3.4, it is anticipated that the ALA will be constructed by personnel and contractors already employed at the Matilda mine site, but may also require the assistance of personnel from the TILG.

In the longer term, after the completion of mining at Andranangoo (expected by 2010), the ALA is intended to be made available for the TLC to acquire. At this time, the ALA may provide tourism opportunities, which may support new businesses and employment. The socio-economic impacts of the ALA are discussed in detail in Section 13.

Section 3

Alternatives

There are a number of alternative transport arrangements available to Matilda to transport personnel and supplies, to the Andranangoo mine site. Research into the transport options available in the Darwin and Tiwi Islands region was conducted by Michels Warren Munday on Matilda's behalf during the preparation of this PER, mainly through telephone interviews with the various charter companies and government agencies. This section provides information on the alternatives identified; more detailed notes on this research are provided in Appendix C.

Transport requirements between Darwin and the mine site can be classified as routine or emergency travel:

- *Routine travel*, for mine personnel that regularly return to Darwin on a fly-in fly-out shiftwork basis, and also for contractors and visitors to the mine site as required. Along with personnel, this routine travel is also utilised for transport of urgent repair goods for mining equipment (in small volumes) and transport of perishable foodstuffs for the mine camp, including frozen foods.
- *Emergency travel*, for urgent transport of personnel or supplies, such as in medical emergencies or evacuation of personnel when a cyclone is forecast.

All the alternatives that have been considered are described in detail below, with reference to their suitability for both routine and emergency travel.

3.1 Fixed Wing Aircraft Direct to Andranangoo ALA

As described in Section 2, fixed wing aircraft travel direct to Andranangoo ALA would be undertaken by charter aircraft on a routine basis, typically three to five times per week. The flight time is approximately 30 minutes from Darwin Airport, and would cost around \$500-800 per flight.

The most likely charter company to be contracted for this transport is Direct Air, who currently provides the service for Matilda to other ALA's. Direct Air utilises a range of single engine, twin engine and large twin engine aircraft, seating four, five or nine passengers respectively. Refuelling is carried out in Darwin for the return trip; however it is proposed that two or three back-up fuel drums would be stored at the Andranangoo mine site fuel storage bund, for emergency use only.

Direct Air does not have the capacity for medical evacuations requiring a stretcher, but can provide quick response flight services within one hour, with pilots on standby night and day.

The AMS use dedicated fixed wing aircraft with the capacity to carry stretchers and medical equipment (see Appendix C) for emergency medical evacuation services to remote areas such as the Tiwi Islands. In locations where these planes cannot land, AMS arranges transport via road, chartered helicopter or boat.

As the flight would be direct to the mine site, there would no longer to be the requirement to undertake the 120-260 km road trip reducing the potential health and safety risks associated with long travel times. Small volumes of urgent supplies and frozen and refrigerated food would be transported along with personnel, and arrive direct at the mine site.

Maintenance costs for the ALA would be borne by Matilda during the life of the Andranangoo mining operation, and following closure would either be taken over by the TLC or the site would be rehabilitated, as described in Section 3.1.1 below.

Environmental issues associated with this option include land clearing that otherwise would not occur, and issues that will require on-going management such as weed and pest control, and surface water and erosion control.

The greenhouse gas impact of this option is 1,812 tonnes CO₂^e in the first three years, mainly due to land clearing (calculations presented in Section 11). Rehabilitation of the ALA could decrease this whole-of-life footprint to 560 tonnes CO₂^e. These figures include 187 tonnes CO₂^e for transport emissions over three years. The transport emissions from this option (per trip from Darwin to Andranangoo) are lower than the emissions from the current arrangement of travel via existing ALA's around Melville Island.

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Routine travel

After ALA construction is complete, this option provides the most time-efficient, low cost method of transport from Darwin to Andranangoo. Also, transport would not be interrupted by poor road conditions during the wet season.

This option allows for reduction of the following risks:

- Reduced worker fatigue by decreased travel time to the site;
- Reduced road travel during the wet season when road conditions are unsuitable for driving; and
- Reduced risk of weed spread from driving through weed-infested areas near Pickertaramoor (the primary airstrip currently being used).

Emergency travel

This option provides the most reliable and cost effective emergency transport facility to and from Andranangoo, and allows Matilda to fulfil its duty of care to its employees. In addition, under this option, emergency supplies such as spare parts, equipment or food could be delivered from Darwin in minimal time.

An ALA would also provide for evacuation of larger groups of personnel, as a plane with up to nine seats could land at the mine site. If a full site evacuation were necessary during an emergency, transport for 28 passengers would be required.

The ALA at Andranangoo would extend the existing ALA network on the Tiwi Islands, and would also provide an emergency facility to the local Tiwi community.

3.1.1 Management options after mine closure

There are two options for management of the Andranangoo ALA after mine closure, which is currently anticipated to be in 2010:

Handover to Tiwi people

Throughout the development of this PER the TLC, TILG and Traditional Owners have strongly indicated their desire that the Andranangoo ALA remain in place after Matilda complete their mining operation, so as to provide on-going access by light aircraft to that area of the island.

Similar to the mining camp, if the Tiwi people choose to retain the ALA upon mine closure, Matilda would relinquish the operation and management of the facility. On-going maintenance such as weed control and grading to prevent erosion would become the responsibility of the Tiwi people, through the TLC or TILG.

In the long term, the camp and ALA could provide opportunities to develop business at Andranangoo such as tourism, which is known as a popular area for recreational fishing. It would also extend the emergency ALA network on the Tiwi Islands.

Rehabilitation

If the Tiwi people choose not to retain the ALA upon mine closure at Andranangoo, Matilda will add the ALA area into their mine rehabilitation and closure program. In this case, the area would be deep ripped and seeded to revegetate cleared areas, and all infrastructure would be removed (as discussed in Section 2.6.2).

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3.2 Light Aircraft to Existing ALAs and Drive to Andranangoo

Utilising light aircraft to the existing ALA's and driving to the Andranangoo mine site is the transport arrangement currently in place, as per the EIS (URS 2006a). Matilda undertakes this travel on average three to five times per week.

The nearest ALA's to Andranangoo are Pickertaramoor, Pirlangimpi (Garden Point) and Milikapiti (Snake Bay) (Figure 1.1). The majority of flights chartered by Matilda are to Pickertaramoor or Pirlangimpi, while Milikapiti is used more rarely. Flight time from Darwin Airport to these ALA's via small aircraft is approximately 30 minutes, similar to that of the Andranangoo ALA option. Direct Air currently provides this service for Matilda utilising a range of single engine, twin engine and large twin engine aircraft, seating four, five or nine passengers respectively. Road transport from the ALA's to the mine site is via four wheel drive utility.

Costs for these routine trips are from \$500 to \$800 for a chartered aircraft, or \$120 per seat on scheduled flights (e.g. with Tiwi Travel). Fuel costs (including fuel transportation costs to the island) for the road transport must be added to this (estimated at between \$40 and \$80 for the return trip), as well as the labour cost incurred for the driver and passengers, who could otherwise be engaged at the mine site in operations. There is also the cost of wear and tear on 4WD vehicles travelling between the off-site ALA's and Andranangoo, and road maintenance costs (particularly during the wet season).

As described in Section 1.4, this option is vulnerable to deteriorating wet season road conditions, which increase travel times, or disable road transport completely resulting in isolation of the mine site.

Environmental issues include the risk of weed spread from known weed-infested areas at Pickertaramoor; the Andranangoo site is relatively weed-free and decreasing the number of vehicle trips to alternative airstrips will also decrease the risk of weed infestation. No land clearing is required in the continued use of this transport method.

Greenhouse gas emissions from this option are estimated at 262 tonnes CO₂^e over the next three years (calculations presented in Section 11).

Routine travel

This option impacts directly on the efficiency of mining operations, as essential personnel are diverted from operational tasks to drive passengers to and from the off-site ALA's (between three and six hours for a return trip). Delivery of urgent parts for repairs is delayed under this option, and frozen food transported regularly thaws out before arriving at the mine camp. Transport costs are also higher within this option when compared with the proposed ALA.

Long driving times in poor road conditions, particularly for solo drivers, is a health and safety risk for Matilda. Wet season rains can result in road closures, isolating the mine site for extended periods and completely disabling this transport option as described in section 14.

Emergency travel

This option does not provide a safe and reliable method of transporting people or supplies in emergency situations, and inhibits Matilda's ability to fulfil its duty of care to its employees. The significant time requirements and potential road closures during the wet season may compromise the safety of site personnel and contractors during an emergency situation.

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3.3 Helicopter Direct to Andranangoo

A helicopter landing pad was included in the original EIS for the mining operation (URS 2006a) and there is now a cleared area at Andranangoo used for landing.

Helicopters were used for some routine travel during the 2006-07 wet season, when road closures made travel to other ALA's impossible.

Environmental issues associated with this alternative are minimal, including a small risk of weed and pest spread.

Greenhouse gas impacts associated with helicopter travel are higher than for small aircraft per trip from Darwin to Andranangoo. It is estimated that 374 tonnes CO₂^e would be produced within the next three years, based on using a six-seater helicopter for routine travel.

Identified helicopter service options

The identified helicopter service options are discussed below:

- Jayrow Helicopters

Jayrow Helicopters (Jayrow) is a Darwin-based commercial charter operator and has supplied personnel transport services to Matilda in the past. Predicted costs for a helicopter for exclusive use by Matilda would be a standing cost of \$30,000 per month, plus an hourly rate for flying time; this is based on 24-hour access, with pilots on standby. Alternatively, a contract arrangement for regular daytime travel would cost about \$1,300 per day standing fee, as well as flying costs.

Jayrow have a range of helicopters including single engine "Jet-rangers" (which seat the pilot plus one passenger), long range helicopters (six passengers plus baggage) and twin engine helicopters (ten to twelve passengers plus baggage). These larger helicopters generally require booking in advance, unless a standing charge is paid.

Jayrow do not currently operate medical and rescue services in the NT, but do run a similar service in Queensland so may have the capability to develop this in the NT in the long term.

It would be likely that some spare drums of fuel would need to be kept at Andranangoo to refuel helicopters for emergency situations.

- Airborne Solutions

Airborne Solutions is a Katherine-based commercial operator, and is planning to establish a helipad in Darwin that Matilda could engage to provide services to the Tiwi Islands. The company currently does not have enough pilots to provide a 24-hour "on call" service, but could provide regular trips for mine personnel.

Airborne Solutions are planning to purchase a Super D2 Squirrel with full medical facilities, with a view to working with local companies to provide a fully staffed 24-hour medical helicopter service. This enterprise is in the planning phase at this stage, and significant investment capacity needs to be raised, possibly with assistance from other bodies such as the NT Government, NT Police, major mining companies and the community.

- Off-shore mining operations

ConocoPhillips uses fixed wing plane charters for overseas and interstate transport, and then helicopters, generally commercially chartered, for transit from Darwin to off-shore operational sites. It was considered unlikely that ConocoPhillips would have a need or wish to share transport services with other companies, and it has not discussed the concept of sharing the costs of establishing a more permanent evacuation service.

According to Jayrow, most off-shore mining companies contract out their helicopter services. Off-shore oil rigs contract helicopters for personnel transport at around \$10,000 per hour. As local oil rigs are located

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around 250 air miles out to sea (two hours travel time), the time taken for a helicopter to return and refuel to attend an emergency situation at Andranangoo, could be much longer than the fixed wing alternatives.

- The Defence Forces

Helicopters operated by the Defence Forces (Defence) are not suitable for transporting passengers (or patients in stretchers) due to the gunship equipment installed within the cabins. Defence regularly charters commercial helicopters for the transport of their own personnel and officers.

There is one twin engine helicopter on contract to the Royal Australian Air Force (RAAF), which is fitted out with rescue winches and emergency equipment and can be airborne within 30 minutes for the rescue of fighter pilots. This helicopter could be called on in an absolute emergency, but would require government intervention and would be committed to the RAAF as a first priority. It would need to travel from Bradshaw (200 air miles from Darwin) which would add significant time to an emergency flight, and would cost between \$5000 and \$7000 an hour.

- Gove based services

The NT Government have established a quick-response helicopter in Gove, but it is not fitted for medical situations. It is mainly used by the Australian Customs Service to search for foreign fishing vessels, and has only a short range; therefore, it would not be suitable for use by Matilda in an emergency.

- NT Police and Department of Health and Community Services

Although the NT Police own a fixed wing plane, they also rely on commercial fixed wing and helicopter support for routine movement of personnel and for emergency evacuations.

In an emergency situation, the NT Police work within the Emergency Service response protocols, and the Department of Health and Community Services (DHCS) would organise transport vehicles through NT AMS, which provides 24-hour emergency evacuation from remote areas (DHCS 2007).

The AMS have advised Matilda that they do not have dedicated access to helicopters and cannot guarantee being able to charter one if required. Furthermore, not all helicopters are capable of carrying a stretcher, nor are they all able to fly at night. For AMS to ensure prompt evacuation, they require access to an airstrip because they own and operate only fixed wing aircraft. On occasions when they have had to rely on the use of helicopters, this has resulted in significant delays in the provision of care to the patient.

Routine travel

Helicopter charters are significantly more expensive (at approximately \$1,300 per day standing charge, plus flight expenses; see Appendix C) than chartering small planes, which makes this option less attractive for regular travel. Helicopters also operate with higher fuel consumption rates than fixed wing aircraft, which increases the greenhouse impacts of helicopter travel.

The low availability of helicopters, in particular larger helicopters capable of carrying six or more passengers, also detracts from the suitability of this option. The cost of relying upon helicopter transport for routine travel to the mine site is not feasible for a small mining company such as Matilda.

With regard to travel time, helicopter travel is a relatively quick option, which would allow efficient delivery of personnel, repair supplies and food.

Emergency travel

In theory, helicopter charter direct to the mine site would be a preferred option in emergency situations, compared with driving to an existing ALA and flying to Darwin (as in Section 3.2).

In practical terms however, the availability of emergency helicopter services in Darwin is low, as discussed above, and any requirements at the Andranangoo mine site may be refused service if the

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helicopters are already in use. The cost of having a helicopter on permanent standby (\$30,000 per month) is prohibitive for a small mining company such as Matilda.

3.4 Boat Travel Direct to Andranangoo

By sea, the estimated time taken for a passenger boat, such as a catamaran, to reach the mining area is around four hours (the *Arafura Pearl* catamaran takes 2.5 hours to arrive at Nguu from Darwin Harbour (TLC, 2007)).

There are also two barge services, Tiwi Barge and Perkins Shipping, which are already utilised by Matilda for bulk goods and equipment. These services travel to Port Melville, Garden Point and Milikapiti, where there are established barge landings. Access to these landings is also affected by the tides, as the surrounding waters are shallow.

Chartering a barge service would cost approximately \$12,000 from Tiwi Barge, and would take 18 hours one way. The Perkins barge maintains a regular weekly service, charged to customers at rates proportional to the cargo to be shipped.

As there are no existing ports or jetties in the area of the Andranangoo mine site, landing a passenger boat near the mining area would be very difficult due to large tide variations, shallow waters and mudflats along the island coast. Also, boat landings would require access to Andranangoo beach, which was restricted as a condition of the EIS (URS 2006a) in order to minimise disturbance to nesting flatback and olive ridley sea turtles (both Commonwealth-listed species). Saltwater crocodiles also inhabit the area, which would create a safety risk to personnel and may require construction of a jetty.

Routine travel

Due to the excessive travel time involved, and the significant construction and environmental issues involved in creating landing infrastructure at Andranangoo, boat travel is not considered a viable option for routine travel to the mine site.

Emergency travel

Similarly, long travel times and lack of infrastructure make this option unfeasible for providing a safe, fast and reliable evacuation option.

3.5 Seaplane Travel Direct to Andranangoo

There are no seaplanes in the NT that can be chartered from Darwin to the Tiwi Islands. Pearl Aviation owns the NT's only sea planes; these are reserved for the exclusive use of Paspaley Pearls and are not available for charter.

Further, seaplanes require a well-protected area for take-off and landing; the only suitable area in the vicinity of Andranangoo would be the Andranangoo Creek, to the east of the mining area. However, this area is strongly affected by tides, and sand banks are occasionally exposed. Also, during wet season rainfall, vegetation debris can be washed into Andranangoo Creek.

The area is a known crocodile habitat, creating safety risks for personnel.

This option may require access to the beach under certain landing conditions, which has been restricted as a condition of EIS approval for the mining operations.

Routine travel

Due to the absence of availability of seaplanes in the NT, the lack of suitable landing area and the environmental issues associated with this transport option, seaplane travel is not considered a viable option for routine travel to the mine site.

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Emergency travel

Similarly, the absence of availability of sea-planes and the lack of a suitable landing area remove seaplane travel as a reliable and viable option for emergency travel.

3.6 Assessment of Alternatives – Best Practice Technology

A best practice technology (BPT) assessment of the various alternatives for transport to Andranangoo has been conducted, to incorporate a wide variety of values and derive a result that “optimises” environmental protection, when considering social, economic and other factors. The five criteria against which each alternative is assessed are as follows:

- Environmental best practice – the level of environmental protection, and the environmental costs or benefits incurred;
- Cost-effectiveness – the costs of implementation, when compared with the level of environmental protection achieved by that option;
- Practicality and effectiveness – how that option contributes to efficiencies in the business and influences health and safety risks;
- Maintenance and liability – the age of any equipment or facility employed may affect its integrity and contribute to a higher environmental risk. Environmental protection measures that require ongoing maintenance or upgrades would score lower in this criteria; and
- Social factors – consideration of the views of the regional community. For example, a technology that improves the level of environmental protection may also have negative social consequences, in terms of employment or access to recreation by the local community.

Each option from Sections 3.1 to 3.5 was assessed against the five criteria described above, and a three-scale performance ranking was applied where a score of 1 is “poor”; 2 is “fair”; and 3 is “good”. By adding the scores from all five criteria, a total performance ranking was derived and a “preferred” option was obtained.

The BPT assessment for the transport options to the Andranangoo mine site is presented in Table 3.1.

It is noted that on the basis of this BPT assessment, the proposed construction of the ALA and retention of the ALA after mining is the preferred option. This is closely followed by construction of the ALA and rehabilitation after mining, and then direct helicopter transport to the mine site.

The existing situation (existing ALA’s plus road transport), boat transport and sea plane transport were the lower rated of the six options.

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Table 3-1 Best practice technology for transport options to Andranangoo mine site (Scoring: 1 = poor, 2 = fair, 3 = good)

Environmental Best Practice	Cost	Practicality and Effectiveness	Maintenance and Liability	Social Factors	Total Ranking (/15)
Construction of Andranangoo ALA for mine transport, and handover to Tiwi people after mining					
2 – requires land clearing and ongoing management for weeds and erosion	3 – construction and operation more cost effective than current cross-island travel. Minimal ongoing maintenance that is within the capacity of TLC/TILG	3 – direct routine and emergency transport to mine site with minimal travel time. Minimises health and safety risks. Provides a long term asset to the Tiwi people	2 – ongoing operation and maintenance to ALA required	3 – potential for business development using the ALA after mine closure. Provides emergency transport facility to Tiwi people and local businesses	13
Construction of Andranangoo ALA for mine transport, and rehabilitation after mining					
3 – requires land clearing that could be returned to natural state within relatively short timeframe	2 – construction and operation more cost effective than current cross-island travel. Rehabilitation costs are additional but can be incorporated into existing program	2 – direct to mine site, minimal travel time. Minimises health and safety risks. Not available for future use	3 – some maintenance of ALA during operation, no long-term maintenance required after rehabilitation	2 – no long term business potential for the Andranangoo area. No emergency transport facility to Tiwi people and local businesses	12
Flight to existing ALA's, road transport to Andranangoo					
2 – requires no land clearing; contributes to increased erosion of roads and risk of weed spread	1 – high costs to Matilda in fuel, personnel travel time and vehicle and road wear and tear	1 – high travel time, wet season road closure issues, not a good emergency option and does not provide duty of care	2 – ongoing maintenance to roads and vehicles required	2 – no long term business potential for the Andranangoo area. No emergency transport facility to Tiwi people and local businesses	8
Helicopter transport direct to Andranangoo					
3 – requires no land clearing beyond current mine area	1 – high charter costs (\$1300/day plus expenses or \$30,000/ month for reliable stand-by), especially for larger groups of people, or volumes of supplies	2 – direct to mine site, minimal travel time. Risk of unavailability of service, which doesn't provide duty of care	3 – minimal maintenance of helipad during operation, no long-term maintenance required after rehabilitation	2 – no long term business potential for the Andranangoo area. No emergency transport facility to Tiwi people and local businesses	11
Boat transport direct to Andranangoo					
1 – requires construction of barge landing in sensitive area	1 – high costs of travel time, and costs of construction for barge landing and maintenance	1 – access subject to tides, travel time very long, crocodile risks at landing point	1 – ongoing maintenance to a boat landing required, in a sensitive area	1 – no long term business potential for the Andranangoo area. No emergency transport facility to Tiwi people and local businesses	5
Seaplane transport direct to Andranangoo					
1 – requires construction of landing and access facilities in sensitive area	1 – high hire costs and low availability of seaplane	1 – low availability of sea planes, access subject to tides so may be unreliable in emergency	1 – ongoing maintenance of beach landing required, in a sensitive area	2 – no long term business potential for the Andranangoo area. No emergency transport facility to Tiwi people and local businesses	6

Section 4

Landform, Soils and Hydrology

This section provides a description of the landform, hydrology and hydrogeology of the ALA site, as well as a summary of regional information. It also describes the potential impacts of the ALA project and proposed management. More detail on the landform and hydrogeology of the Andranangoo mining area, and additional regional information, is supplied in the EIS (URS 2006a).

4.1 Landform

4.1.1 Land units and topography

The Andranangoo mine site is located on the northern coast of Melville Island. While the mineral sands mining area is based on the coastal sand dunes, the proposed ALA is located on the laterite escarpment south of the dune system, where the existing mine camp and processing plant have also been established. This area is characterised by *Eucalyptus*-dominated woodland, which is typical of extensive areas of upland terrain throughout Melville and Bathurst Islands (Metcalf, 2006). There are no drainage features traversing the site and gradient is flat.

The ALA construction area is located completely within one “land unit”, according to Hollingsworth (2003). This land unit is described as sand plain with zero to one per cent slope, and *Eucalyptus* open forest or woodland with tussock grassland understorey; this is representative of the landscape and vegetation throughout the Tiwi Islands (Hollingsworth 2003).

4.1.2 Soils

Soil type at the proposed ALA site is deep (greater than 1.5 metres depth to bedrock), non-gravelly, imperfectly drained, loamy sand over sandy clay loam of neutral pH, formed in Tertiary sandstone colluvium. It has low to moderate risk of soil erosion, and a slight flooding risk (Hollingsworth 2003).

Soils of this type are classified as “Kandosols”, or leached gradational soils, which have a gradual texture increase with depth and are not saturated for prolonged periods. Gradually increasing clay content and colour intensity with depth characterises these soils (Hollingsworth 2003). Generally speaking, the soils that dominate the Eucalyptus plateau are described as red sandy earths to sandy loams (URS 2006a).

4.1.3 Regional geology

The geology in the vicinity of the Andranangoo ALA is predominantly based on sedimentary rock types. Haig *et al* (2003) describe the regional stratigraphy of the Tiwi Islands as relatively simple, consisting of Quaternary aged alluvium, Tertiary aged Van Diemen Sandstone and the underlying Cretaceous aged Mookin mudstone and Wangarlu Mudstone members of the Bathurst Island Formations. Superficial formations within ten metres of the surface consist alluvial silt, sand, and gravel sediments (Haig *et al* 2003).

4.2 Surface Water

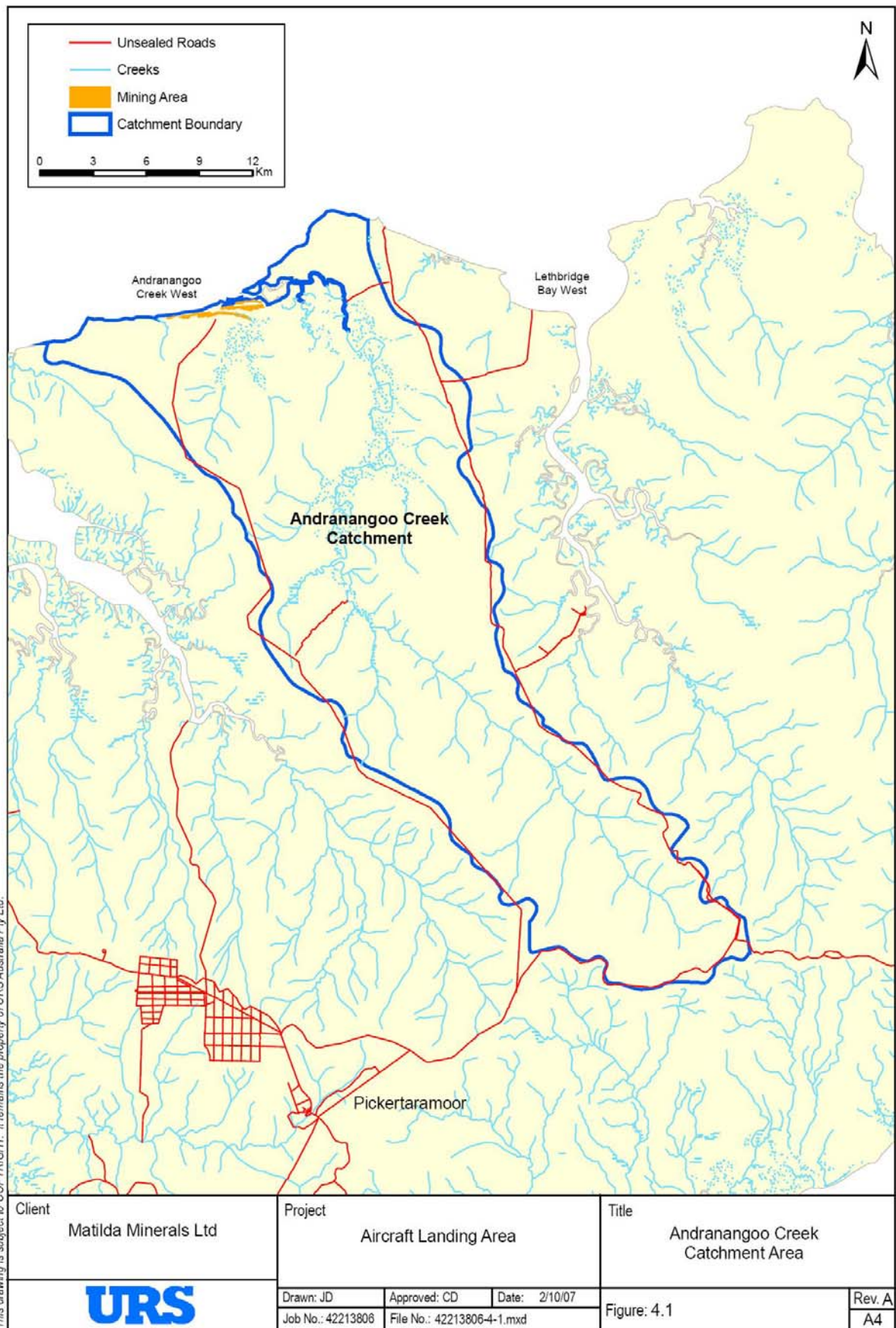
4.2.1 Local hydrology

The proposed ALA site is located inside the Andranangoo Creek catchment, which is an undeveloped tropical rural catchment with a total area of 55,400 hectares (554 km²) (TLC 2004) (see Figure 4.1). The area of disturbance required for the ALA is a very small proportion of the catchment area; less than 0.5%.

Andranangoo Creek extends upstream approximately 45 kilometres south of Matilda’s mine site and the proposed ALA. The downstream end of the creek, where there are freshwater and estuarine areas that discharge into the Timor Sea, is less than one kilometre, to the east of Matilda’s mining area. A distance of approximately 900 metres separates an extensive brackish swamp from the proposed ALA site (the swamp area is to the east of the ALA, see Figure 2.1).

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Stream flows in Andranangoo Creek are greatest during the monsoonal wet season, when rainfall is greatest. Many springs dry up by the end of the dry season on the southern side of Melville Island, however spot flow measurements in the upper portion of Andranangoo Creek in the late dry season in 2001 indicated a flow of 347 litres per second (Haig et al 2003).

Near the Andranangoo mining area, a freshwater spring discharges from the base of the escarpment into the sand dune system. This spring is approximately 600 metres west of the northern end of the ALA.

The mining activities at Andranangoo are located predominantly within a natural drainage line north of a scarp at an elevation of about two to three metres Australian Height Datum (AHD). Drainage migrates eastward towards wetlands, damplands and tidal mangroves associated with the Andranangoo Creek, located approximately 500 metres from the eastern most mining block (URS 2006a).

The proposed ALA site is on relatively flat ground with no internal drainage features, on the escarpment up-gradient of the mining area. Appropriate stormwater drainage design will be incorporated into ALA construction.

4.2.2 Local hydrogeology

Groundwater studies were carried out by URS at the Andranangoo mine site in 2005 prior to development of the EIS for the mining operation. These studies provided information regarding the hydrogeological characteristics of the alluvial aquifers underlying the mine site and vicinity (URS 2005).

For the region surrounding the proposed ALA site, groundwater occurs within unconfined aquifers in the saturated Van Diemen Sandstone. Regionally, the Van Diemen Sandstone is present on most of Melville and Bathurst Islands, where the maximum known thickness is approximately 70 metres. The aquifer typically contains a 10 to 30 metre unsaturated zone (URS 2005).

Regional groundwater quality is generally fresh, although bores constructed close to the coast can have brackish to saline groundwater, where a saltwater interface with the ocean is present (URS 2005).

In the vicinity of the proposed ALA, depth to groundwater is approximately 4.5 to 5.5 metres below the ground surface, based on data from nearby monitoring wells.

4.2.3 Climate and rainfall

Average climatic conditions for the region are described in Table 4.1, based on data obtained from the Bureau of Meteorology (BOM) weather station at Milikapiti, approximately 25 kilometres west of the proposed ALA site. These data have been collected between 1959 and 1997, and show a regional annual rainfall of around 1,580 millimetres (BOM 2007).

Matilda has also collected daily rainfall data at the Andranangoo mine site, from January 2006 to July 2007. These data are summarised on a monthly basis in Figure 4.2.

The Tiwi Islands have a tropical climate, influenced by the north-west monsoon and two distinct seasons; wet and dry (BOM 2007). There are large spatial and temporal variations in rainfall across the island; flooding can occur in various locations at vastly different stages throughout the wet season, and for varying lengths of time.

The wet season is characterised by high rainfall periods with around 90% of the annual rain falling between November and April, when monsoons are typical and there is a chance of tropical cyclones. There is an average of 0.4 cyclones per year in the project area, the main impacts of which are wind damage, storm surge and flooding as a result of heavy rain. Wet season wind conditions are predominantly north westerly (BOM 2007).

Rainfall during the dry season is minimal, although it exhibits greater variability compared to wet season falls. Dry season winds are predominantly south easterly.

Temperatures are generally high throughout the year, with average maximum temperatures from 31°C to 34°C, and minimums in the range of 18°C to 24°C (BOM 2007).

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Table 4-1 Average climate statistics for Milikapiti, Melville Island (1959 to 1997) (BOM 2007)

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean maximum temperature (°C)	32.0	31.6	32.1	33.5	32.9	31.5	31.2	32.0	33.0	33.7	33.8	32.8	32.5
Mean minimum temperature (°C)	23.7	24.0	23.7	22.7	21.1	19.3	18.1	19.9	21.7	23.3	24.1	24.1	22.1
Mean rainfall (mm)	308.1	321.7	345.5	102.3	67.4	5.9	0.9	4.8	5.9	53.3	118.1	285.8	1583.4
Mean number of days of rain ≥ 1 mm	13.2	11.8	12.1	5.8	2.5	0.4	0.2	0.2	0.6	2.8	7.2	11.3	68.1
Mean 9am wind speed (km/h)	7.4	7.4	7.2	6.7	8.3	10.0	8.8	7.4	7.6	7.1	7.9	7.1	7.7
Mean 3pm wind speed (km/h)	12.3	12.2	11.3	12.4	14.2	16.3	16.2	18.7	18.8	17.1	15.2	11.8	14.7

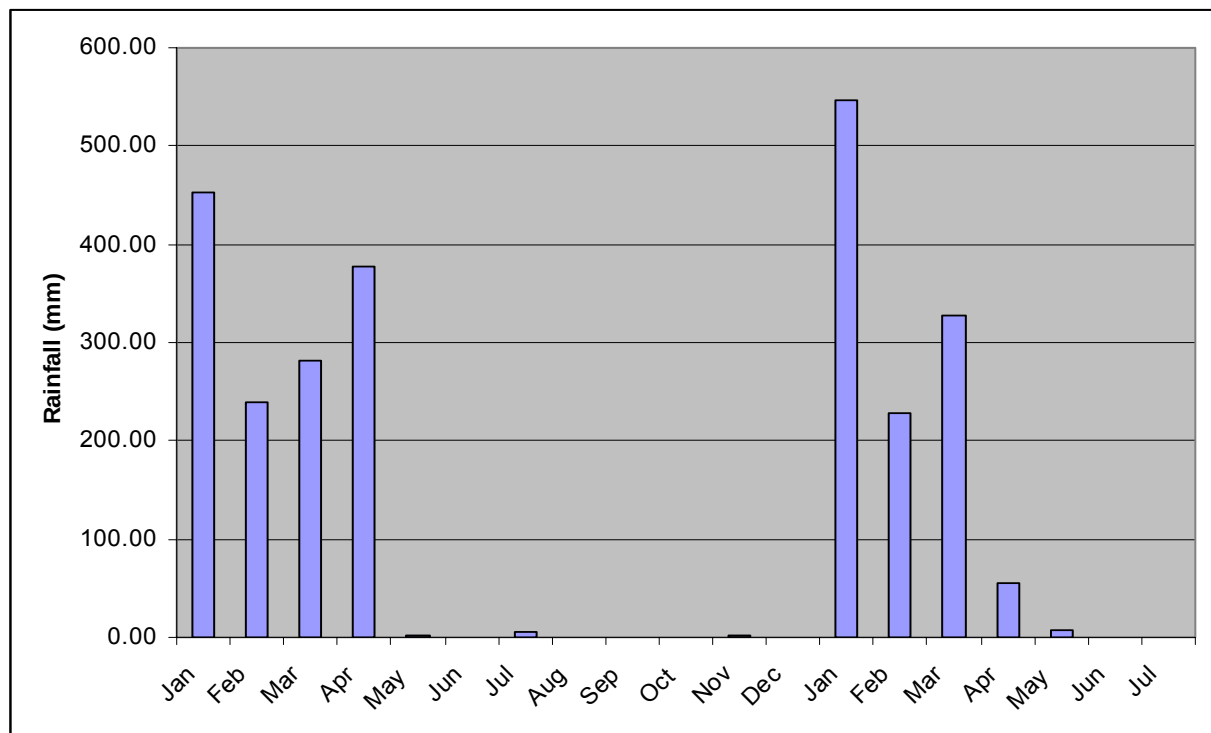


Figure 4-2 Monthly rainfall measured at the Andranangoo mine site (January 2006 to July 2007)

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4.3 Impacts of the Project

Construction of the ALA will require vegetation clearing and compacting of the soil surface. As the site is naturally flat the project will not significantly alter natural landforms and drainage lines. However, stormwater runoff will increase as infiltration of rainfall into the cleared hardpan will be significantly lower than the natural vegetated surface. Proposed stormwater management is described in Section 4.4.

The ALA site is located sufficiently distant from the local waterways (Andranangoo Creek to the east and the freshwater spring to the west, below the escarpment) that any increase in stormwater runoff is not anticipated to impact streamflows or contribute to sedimentation in those watercourses.

There is potential for some erosion of the soil from the surface of the ALA, particularly during the typically heavy rainfall events of the wet season. This low to moderate erosion risk will most likely continue throughout the life of the ALA, and annual or bi-annual maintenance will be required to repair rivulets or sheet erosion.

ALA construction is planned for dry season conditions, which reduces the high erosion risk associated with exposed, freshly cleared soils, prior to compaction of the ALA surface.

The ALA is not expected to suffer flooding in the wet season, as the site is elevated from the low-lying sand dune system, and is sufficiently distant from watercourses to avoid inundation from surface water flows after heavy rains.

Storage or handling of hazardous substances such as aviation fuels at the ALA poses a potential risk of spills, which could subsequently impact on the quality of surface water or groundwater. This risk is very minimal as refuelling is not planned to be carried out at the Andranangoo ALA, and any minor volumes of fuel (two or three 205 litre drums) would be stored at the existing fuel storage bund at the mine site.

For these reasons, the ALA is not anticipated to impact on groundwater or surface water flows, or quality.

4.4 Management

Soil erosion risks will be managed in order to preserve the ALA in good operational condition and to protect the surrounding vegetation from sedimentation and soil degradation. Matilda will install stormwater drainage consisting of table drains running parallel to the Runway. At calculated intervals, runoff will be taken out of table drains via mitre drains. The outlet of these mitre drains will be constructed with level spreaders which will remove sediment prior to final discharge into the surrounding vegetation at non-scouring velocities. If erosion continues to occur, silt fencing will also be installed to provide further control of sediments.

Matilda will expand the existing monitoring program for soil erosion to include the ALA. This program utilises silt traps and photo monitoring at strategic points to gauge sediment movement.

It is likely that stormwater drains and turn-outs would require reshaping and maintenance after heavy rainfall periods; probably annually after the wet season. Likewise, the surface of the ALA will require grading to repair any rivets caused by rainfall. Matilda will schedule regular checks and maintenance of the ALA to ensure integrity is maintained. Routine monthly checks will be incorporated into the soil erosion monitoring program.

As described previously, storage and handling of hazardous substances including aviation fuel will be in accordance with Australian Standard 1940. Only small volumes of aviation fuel (e.g. two or three 205 litre drums) would be stored at the existing fuel storage bund at the Andranangoo mine site. Any accidental spills that occur on the ALA site will be cleaned up immediately, with existing spill response equipment that is available at the mine site.

Matilda will implement the existing EMP's for surface water quality (which includes soil erosion management), groundwater quality, and hydrocarbons and hazardous substances. These EMP's contain objectives, actions and monitoring programs, into which the necessary management of impacts specific to the ALA have been integrated. These are presented in Section 17.

Section 4

Landform, Soils and Hydrology

As described in Sections 2 and 3, after closure of the mining operation at Andranangoo the ALA will either be ripped and seeded to rehabilitate it to its pre-disturbance state, or will be handed over to the TLC for ongoing use and maintenance as a permanent facility. If the former option is preferred, as determined through consultation with the TLC and other stakeholders, the natural topography will be reinstated by Matilda, with the access road and surface water drains removed.

4.5 Commitments

Matilda commits to installing stormwater drains and turn-outs along each edge of the Runway at the ALA.

Matilda commits to expanding the existing soil erosion monitoring program to include the ALA.

Matilda commits to implementing existing EMP's for surface water quality, groundwater quality, and hydrocarbons and hazardous substances.

Matilda commits to the storage and handling of hazardous substances in accordance with Australian Standard 1940, and with the Hydrocarbons and Hazardous Substances EMP.

If rehabilitation of the ALA is preferred at the time of mine closure, Matilda commits to reinstating the natural ground surface, removing surface water drains and other features, and deep ripping and seeding the ALA site.

Section 5

Flora

This section provides a description of the flora of the ALA site, as well as the potential impacts of the project and proposed management. More detail on the flora of the Andranangoo mining area, and additional regional information, is supplied in the EIS (URS 2006a).

5.1 Existing Conditions

Two flora surveys have been completed for the proposed ALA site as part of this PER: the first in late dry season conditions (October 2006) and a second during late wet season conditions (May 2007). These surveys were conducted by Kristin Metcalfe, and the detailed flora report for the area is provided in Appendix D. This section summarises results from the surveys, with particular focus on threatened species listed under the NT *Territory Parks and Wildlife Conservation (TPWC) Act* and the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act*.

During each survey, the ALA site was thoroughly traversed on foot and all plant species present were recorded. Data on the vegetation structure and composition, including percentage cover of all species in the upper, mid and lower strata of vegetation was also taken, along with photographic records. Quadrat surveys were applied to assess the density of cycads (a species of conservation significance, discussed in Section 5.1.3 below), in four study plots with three replicate quadrats within each (twelve quadrats in total) (Metcalfe 2007a).

5.1.1 Floristics

A total of 82 plant species were recorded within the survey area (see Appendix D for species list). Thirty four were recorded in the October 2006 surveys, with an additional 48 species recorded during May 2007, most of which were ground cover species. Given the area had been burnt just prior to surveys in October 2006, and the timing of the work (late dry season) it was not surprising that 58% more species were recorded during the recent wet season survey (Metcalfe 2007a).

In the upper vegetation stratum *Eucalyptus tetradonta* (Darwin stringybark) (8%), *E. miniata* (Darwin woollybutt) (8%) and *Corymbia nesophila* (9%) occur as dominant to co-dominant species in stands 18 to 20 m high. The sand palm *Livistona humilis* is the dominant mid-stratum species (3%), with *Acacia leptocarpa* (1%) and juvenile *E. tetradonta* (1%). The southern tip of the ALA has cycads (*Cycas armstrongii*) in the mid and ground stratum. Fewer cycads were found in the central section of the proposed ALA (Metcalfe 2007a).

5.1.2 Vegetation community

The vegetation community documented within the project area is characteristic of extensive areas of upland terrain on Melville and Bathurst Island. The vegetation community throughout the site is described as tall woodland to open woodland in which *E. tetradonta*, *E. miniata* and *Corymbia nesophila* occur as co-dominant species (Metcalfe 2007a). This vegetation type is continuous throughout both the Runway area to be completely cleared and the Approach/Take-Off areas that will be partially cleared.

Substantial damage to the existing vegetation was incurred during cyclone Ingrid in 2004. Cyclone damage to tree canopies was observed during the October 2006 survey and despite substantial recovery during the wet 2006–2007 season, was still evident across the site in May 2007 (Metcalfe 2007a).

5.1.3 Significant flora species

Cycads (*Cycas armstrongii*) were common in the area to be cleared for the ALA, and are listed as Vulnerable under the TPWC Act. A quantitative assessment of cycad density at the ALA was conducted during flora surveys, with a resulting mean density of 808 (± 234) cycads per hectare. The distribution of cycads was patchy however, varying from zero to 24 plants per 0.01 hectare plot (Metcalfe 2007a).

Cycas armstrongii is endemic to the NT and is restricted to the eastern Top End and the Tiwi Islands. Populations of this species are predicted to decline due to land clearing and fire damage, largely from increased fuel loads generated by introduced grasses. A management program has been established by

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the NT Government in which a permit system is required for the removal or wilful destruction of any cycads in the NT (Metcalf 2007a). Matilda has been issued with a Permit to Take Wildlife for Commercial Purposes to remove this species.

Other than *Cycas armstrongii*, no plant species of conservation significance were detected within the proposed ALA.

Likewise, no vegetation communities of high conservation value or ecological significance occur within the ALA, which comprises only *Eucalyptus*-dominated tall woodland.

5.1.4 Weeds

No weed species were observed within the ALA during flora surveys in October 2006 or May 2007.

5.2 Issues and Impacts

The vegetation community within the ALA does not have special conservation significance and the main impact on flora will be the clearing of nine hectares, and partial clearing of 7.4 hectares, of upland eucalypt forest and woodland habitat (Metcalf 2007a). As no drainage features appear to traverse the site, and given the distance to the nearest surface water body, construction of the ALA is unlikely to have any significant impacts on aquatic flora (Metcalf 2007a).

Matilda's existing vegetation monitoring program has documented the presence of weed species to the Andranangoo area, potentially in association with mine transport activities and vegetation disturbance for mine development (Metcalf 2007b). While the baseline surveys of the ALA recorded no weed species, the site lies adjacent to the existing access road to the Andranangoo mine site, and clearing for the ALA would adjoin existing clearing associated with the mine operations and stockpile area. Matilda is participating in an island-wide weed management program in cooperation with the TLC and Great Southern Plantations.

There is a high risk that weeds occurring within the mining camp will disperse into, and may proliferate in, the disturbed ground associated with the ALA. The primary threat to vegetation communities through the construction of the ALA is the potential for the spread of weeds from the mining camp into the ALA area (Metcalf 2007).

5.3 Management

During construction of the ALA, trunks and debris from vegetation clearing will be piled in designated areas and burnt. However, if rehabilitation of the ALA is required, the cleared vegetation would remain stockpiled for re-spreading during rehabilitation.

Vegetation clearing activities will be guided by hand-held GPS units so as to accurately identify clearing boundaries, and avoid accidental over-clearing.

With regard to clearing of cycads, Matilda has a *Permit to Take Wildlife for Commercial Purposes* to remove this species from NT Parks and Wildlife, NRETA. In accordance with the permit cycads will be documented, tagged, harvested and offered to the local Tiwi community, for sale to collectors and nurseries, with any income provided to the TLC.

Weed management at the ALA will be integrated into Matilda's existing weed management program. The site will be included in bi-annual vegetation monitoring to identify weed infestations, and if weeds are located appropriate management will be implemented as quickly as possible.

A training program will be developed for weed awareness, identification and training for mine personnel focusing on reducing the risk of spread and introduction. Matilda will continue to work in cooperation with the TLC and Great Southern Plantations to develop and implement weed management and eradication programs for the island.

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If Matilda needs to bring any construction equipment to the site from outside the Tiwi Islands, it will be inspected prior to loading onto the barge in accordance with the barge operators' quarantine procedures. Similarly, decontamination procedures will be followed to remove potential weed matter from any equipment being brought in from weed-infested areas of Melville Island.

Matilda's existing Flora EMP and the vegetation conservation issues identified for the ALA have been integrated into this plan (see Section 17.7).

5.4 Commitments

Matilda commits to using hand-held GPS units to identify clearing boundaries during construction of the ALA, to avoid accidental over-clearing.

Matilda commits to collecting cleared vegetation during ALA construction into designated areas, to minimise the impact of dumping on the surrounding vegetation. This material would be burnt when dry, or if the ALA is to be rehabilitated after mine closure, the material would remain stockpiled for respreading during rehabilitation.

Matilda commits to including the ALA in the existing vegetation monitoring program, to allow for early detection of weeds in the area. Where weeds are identified, Matilda commits to applying appropriate weed control measures throughout the ALA, camp and mine site, to minimise weed spread and eradicate weeds where possible.

Matilda commits to developing weed identification and awareness training for mine personnel.

Matilda commits to participating in the island-wide weed management program in cooperation with TLC and Great Southern Plantations.

Section 6

Fauna

This section provides a description of the fauna of the ALA site, as well as the potential impacts of the project and proposed management. More detail on the flora of the Andranangoo mining area, and additional regional information, is supplied in the EIS (URS 2006a).

6.1 Existing Conditions

A fauna survey of the proposed ALA site was conducted by Indicus Biological Consultants Pty Ltd (Indicus), in September 2006 (see Appendix E for full report). This section outlines the results from the fauna survey, with particular focus on threatened species listed under NT *Territory Parks and Wildlife Conservation* (TPWC) Act and Commonwealth *Environment Protection and Biodiversity Conservation* (EPBC) Act.

Surveying involved transect surveys of the proposed ALA site. Sampling methodologies were developed according to NRETA Guidelines, and involved a range of trapping methods (cage traps, Elliott traps and pitfall traps), bird surveys conducted in the morning and afternoon, daytime searches for reptiles, mammals, scats and signs of animals, and nocturnal fauna searches by spotlight (Indicus 2006).

6.1.1 Fauna species

A total of 46 species were recorded during the field survey. Six of these were mammals, including five native marsupials, and ten reptiles were identified, including five skinks. Thirty of the species identified were birds, including the northern rosella, the blue-winged kookaburra and the tawny frogmouth (Indicus 2006). A complete list of recorded species is presented in Table 6.1, along with relevant listings of any significant species in Commonwealth and NT legislation, and international wildlife protection agreements.

Table 6-1 Fauna species recorded during surveys of the proposed ALA site

Species	EPBC Act (Cth)	TPWC Act (NT)	International Agreements
Mammals			
Agile wallaby, <i>Macropus agilis</i>			
Brush-tailed rabbit-rat, <i>Conilurus penicillatus</i>		V	
Common brush-tail possum, <i>Trichosurus vulpecula</i>			
Northern brown bandicoot, <i>Isodon macrourus</i>			
Pale field rat, <i>Rattus tunneyi</i>			
Swamp buffalo, <i>Bubalus bubalis</i>			
Birds			
Bar-shouldered dove, <i>Geopelia humeralis</i>			
Blue-faced honeyeater, <i>Entomyzon cyanotis</i>			
Blue-winged kookaburra, <i>Dacelo leachii</i>			
Brahminy kite, <i>Haliastur indus</i>			
Chestnut-breasted mannikin, <i>Lonchura castaneothorax</i>			
Forest kingfisher, <i>Toadiramphus macleayi</i>			
Grey-crowned babbler, <i>Pomatostomus temporalis</i>			
Grey shrike-thrush, <i>Colluricincla harmonica</i>			
Large-tailed nightjar, <i>Caprimulgus macrurus</i>			
Leaden flycatcher, <i>Myiagra rubecula</i>			B
Masked owl, <i>Tyto novaehollandiae</i>	E	E	
Northern rosella, <i>Platycercus venustus</i>			
Olive-backed oriole, <i>Oriolus sagittatus</i>			

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Species	EPBC Act (Cth)	TPWC Act (NT)	International Agreements
Peaceful dove, <i>Geopelia striata</i>			
Pheasant coucal, <i>Centropus phasianinus</i>			
Pied butcherbird, <i>Cracticus nigrogularis</i>			
Rainbow bee-eater, <i>Merops ornatus</i>			J
Red-winged parrot, <i>Aprosmictus erythropterus</i>			
Red-tailed black-cockatoo, <i>Calyptorhynchus banksii</i>			
Rufous whistler, <i>Pachycephala rufiventris</i>			
Spangled drongo, <i>Dicrurus bracteatus</i>			
Silver-crowned friarbird, <i>Philemon argenticeps</i>			
Sulphur-crested cockatoo, <i>Cacatua galertia</i>			
Tawny frogmouth, <i>Podargus strigoides</i>			
Varied sittella, <i>Daphoenositta chrysoptera</i>			
Weebill, <i>Smicromis brevirostris</i>			
White-bellied cuckoo-shrike, <i>Coracina papuensis</i>			
White-throated honeyeater, <i>Melithreptus albogularis</i>			
Yellow oriole, <i>Oriolus flavocinctus</i>			
Yellow-rumped mannikin, <i>Lonchura flaviprymna</i>			
Reptiles			
Arboreal snake-eyed skink, <i>Cryptoblepharus plagiocephalus</i>			
Bynoe's gecko, <i>Heteronotia bynoei</i>			
Douglas' skink, <i>Glaphyromorphus douglasi</i>			
Grey's menetia, <i>Menetia greyii</i>			
Port Essington ctenotus, <i>Ctenotus essingtonii</i>			
Red-sided rainbow skink, <i>Carlia rufilatus</i>			
Spotted tree monitor, <i>Varanus scalaris</i>			
Storr's snake-eyed skink, <i>Morethia storii</i>			
Striped rainbow skink, <i>Carlia munda</i>			
Two-lined dragon, <i>Diporiphora bilineata</i>			

Key to conservation status:

- E Species classified as endangered
V Species classified as vulnerable
J Japan-Australia Migratory Birds Agreement (JAMBA) 1974
B Bonn Convention for the conservation of migratory species (Bonn) 1979

6.1.2 Fauna habitats

Vegetation at the proposed ALA site consisted of eucalypt open forest, which is common on the Tiwi Islands and across the NT Top End. The eucalypt open forest consisted mainly of *Eucalyptus miniata*, *Eucalyptus tetradonta* and *Corymbia nesophila* and the area appeared to have been burnt during the recent dry season (2006).

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6.1.3 Feral animals

Of the species recorded at the ALA site, only the swamp buffalo is a feral species.

While swamp buffaloes can cause significant natural resource degradation, they are also considered to be a highly valued food source to the Tiwi Islanders, and are also valued for their contribution to tourism through trophy hunting, and their confirmed disease-free status (TLC 2004).

The most obvious signs of buffalo damage are disturbance of soils and vegetation owing to overgrazing and wallowing in mud. Buffaloes have been implicated in the spread of weeds, particularly *Mimosa pigra* on floodplain habitats. Habitat modification by buffaloes has been observed to reduce the nesting activity of magpie geese, which has major management implications as magpie geese are an important resource for subsistence and recreational hunters. There is also anecdotal evidence that grazing by buffalo may reduce nesting activity in crocodiles (NRETA 2007).

6.1.4 Significant fauna species

Of the species that were recorded during the survey, only two were listed under the TPWC Act; the brush-tailed rabbit-rat is listed as Vulnerable and the masked owl is classified as Endangered. The masked owl is also classified as Endangered under the EPBC Act.

The leaden flycatcher and rainbow bee-eater were two other significant species that were recorded during the survey, listed under international agreements. The leaden flycatcher is listed under the Bonn Convention, while the rainbow bee-eater is listed under the JAMBA Agreement.

Brush-tailed rabbit-rat

The brush-tailed rabbit-rat was recorded during the September 2006 survey. This species appears to have declined in number significantly in the NT, and the population on the Tiwi Islands is one of three recognised subspecies. However, the brush-tailed rabbit-rat is unusually abundant on the Tiwi Islands, and favours tall eucalypt forest habitat. It has a small home range of around one hectare; therefore clearing for the ALA is likely to result in the loss of individuals, but given the relatively small area of disturbance this is unlikely to have a significant impact on the overall population of the species on the island (Indicus 2006).

Masked owl

The masked owl was recorded incidentally during the survey of the ALA, there were no roosting nor nesting sites recorded within the proposed ALA. The Tiwi Island subspecies has previously been listed as Vulnerable, but recent analyses of its status by NRETA resulted in its conservation status being upgraded to Endangered (Indicus 2006).

Based on population densities recorded elsewhere in Australia, the masked owl's home range is assumed to be five to ten square kilometres, and the total population of the Tiwi Island subspecies has been estimated at about 1000 mature birds. This subspecies is believed to occur mainly in open forest, although it has been known to roost and forage in a range of habitats (Indicus 2006).

Rainbow bee-eater and leaden flycatcher

Both the rainbow bee-eater and leaden flycatcher are known to utilise a range of habitats and were recorded during the September 2006 survey. Both birds are common on the Tiwi Islands and throughout Australia therefore it is considered unlikely that clearing associated with ALA construction will have a significant impact on these species (Indicus 2006).

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6.2 Impacts and Issues

Construction of the ALA will involve removal of nine hectares of eucalypt open forest, and partial clearing of a further 7.4 hectares. Given that this vegetation community is widespread throughout the Tiwi Islands, and is surrounded by relatively vast areas of undisturbed similar vegetation, it is considered that the proposed ALA will impact fauna at a local scale only.

With regard to listed species, Indicus suggest that the ALA development will likely result in the loss of habitat for several individual brush-tailed rabbit-rats, but that this would not affect the overall population of the species on Melville Island. Similarly, clearing would reduce the available habitat for masked owls in the local area, but would not impact the overall population (Indicus 2006).

As described above, the rainbow bee-eater and leaden flycatcher are common on the Tiwi Islands and use a range of habitats; therefore the ALA would be highly unlikely to impact those listed species either (Indicus, 2006).

Other impacts to fauna habitats could occur during construction, particularly if debris and soil is pushed onto undisturbed areas, smothering vegetation that would otherwise have been left intact (Indicus 2006).

During ALA operations, the risk of pest and weed intrusion increases due to traffic entering the site from outside the Andranangoo area. Weed infestations can lead to altered fire regimes, which are also known to impact fauna ecology. Introduced pest animals such as feral ants and cane toads are another potential threat to local fauna (Indicus 2006).

6.3 Management

During ALA construction, Matilda will adopt Indicus' recommendations to designate areas for cleared materials at the ALA, avoiding widespread dumping of sands, soils and other materials that might impact on surrounding vegetation (as mentioned in Section 2.3.2).

Matilda is currently operating under an existing Fauna EMP and a Pest, Weeds and Disease EMP, which outline objectives and management actions for protecting fauna at Andranangoo. These EMP's have been revised to include fauna management considerations relating to the ALA, and are provided in Section 17.8 and Section 17.9 respectively.

As part of the existing EMP's, a feral ant monitoring program has been initiated in cooperation with TLC, and sample sites will be added in the ALA. In order to mitigate the risk of cane toad entry onto the Island via aircraft traffic, Matilda will work with the TLC to install cane toad traps around the edges of the ALA. Monitoring and reporting for the traps is included in the EMP's.

Matilda consults with the TLC for advice on feral mammal control. Currently the TLC are actively controlling feral pigs, but these are not present in the vicinity of Andranangoo. Matilda will continue this consultation with the TLC and will undertake feral mammal control in accordance with their directions.

Matilda has engaged Indicus to undertake an annual fauna monitoring program at a total of eight sites around the Andranangoo mine site. This program provides baseline data, and over time will provide an indication of any longer-term impacts of the mining activity on local fauna, which in turn will guide rehabilitation objectives. The program already includes sites in the eucalypt woodland in the vicinity of the ALA, and also involves targeted masked owl surveys in areas to be cleared.

6.4 Commitments

Matilda commits to collecting cleared vegetation during ALA construction into designated heaps, to minimise the impact of dumping on the surrounding vegetation.

Matilda commits to installing and monitoring cane toad traps around the perimeter of the ALA.

Matilda commits to including the ALA in the existing feral ant monitoring program.

Section 7

Archaeology and Heritage

This section provides a description of the archaeology and heritage of the ALA site, as well as the potential impacts of the project and proposed management. More detail on the archaeology and heritage of the Andranangoo mining area, and additional regional information, is supplied in the EIS (URS 2006a).

7.1 Existing Conditions

7.1.1 Regional heritage

The Tiwi Islands are home to one of Australia's most remarkable Aboriginal groups, whose isolation over thousands of years has helped them preserve their unique language and culture (Alford 2005). The first evidence of foreigners coming to the Tiwi Islands dates to the early 1600s when the Macassans sailed from the Indonesian island of Sulawesi in search of the sea cucumber (trepang) (Alford 2005).

The Tiwi Islands were declared an Aboriginal Reserve in 1941 and on the 7th of September, 1978, title deeds for their land were handed back to the Tiwi people by the then Minister for Aboriginal Affairs (TLC, 2004). The Tiwi people have a land council and a local government and also traditional groups which are also responsible for ceremony and care of country (TLC, 2004). Access to the islands is provided under approval by the TLC and is authorised through the issuing of permits under the provisions of the NT *Aboriginal Land Act*.

The proposed ALA is located in the traditional lands of the Tiwi Aboriginal people and more specifically within the area of the Yimpinari group.

7.1.2 Archaeological sites

An archaeological survey of the ALA site was completed in November 2006 (see full report in Appendix F). The survey consisted of 30 pedestrian transects of 150 meters length, in an east-west direction.

No Aboriginal archaeological sites or objects were identified during the survey. While there are a range of resources on Melville Island, the proposed ALA site is a weathered and laterised plain. There are no features in the area such as creeks or higher ground that could have been the focus of resource use in the past. Therefore, the possibility of archaeological material on the proposed ALA is low (Crassweller 2006).

No previously recorded Aboriginal archaeological sites are recorded for the ALA site on the Archaeological Site Register held with NT Heritage Conservation Services (HCS), nor on the registers held by the Commonwealth Government.

7.1.3 Aboriginal sacred sites

The TLC undertook consultations with Traditional Owners on behalf of the AAPA to identify any Aboriginal sacred sites in the project area. As the proposed ALA extends across the boundary of mining lease MLN 24510 into exploration lease boundary EL 23862 (see Figure 2.1), this process was carried out in two parts:

- during the EIS process for Matilda's mining operations in 2006, for the whole of MLN 24510; and
- during the development of this PER in 2007, for the small section of EL 23862 affected by the ALA project.

The two AAPA clearance certificates granted for the project area are provided in Appendix G (AAPA 2006, AAPA 2007).

Consultations with the Traditional Owners indicated that an old grave site was located within the vicinity of Andranangoo Creek although the exact location was not known. A site visit was conducted by the TLC and Traditional Owners in 2006 and a search for the grave site was unsuccessful, however it was

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assumed that the grave would have been placed on high ground (URS 2006a). The consultation process for this PER also confirmed that the ALA was unlikely to impact on this site.

The conditions of both the AAPA Authority Certificates include a direction that if evidence of a burial site is discovered during operations, operations will cease in that area and the TLC will be notified as soon as possible (Appendix G).

Advice from the TLC is that all employees of Matilda and associated contractors should be made aware of the possibility of grave sites. They should also be directed to be observant and take care when disturbing ground, to stop work if they see a burial pole (even if it is in poor condition), and to report it to the TLC or Traditional Owners as soon as possible (TLC *pers comm*, 2005).

No historical or archaeological artefacts, including burial sites, have been observed by Matilda since the commencement of mining operations.

7.1.4 Historic sites

No historic sites or artefacts were recorded in surveys of the ALA site (Begnaze 2006).

The probability of historic material in the area is also low as background research suggests that any historic activities would have been fleeting (Crassweller 2006).

7.2 Issues and Impacts

It is not anticipated that the proposed ALA will impact negatively on archaeological or historical values in the area. As for any development, there is the remote possibility of unearthing previously unidentified archaeological material; this should be managed with the appropriate procedures for ceasing earthworks and contacting the NRETA's Heritage Conservation Services office or the TLC prior to proceeding with works.

7.3 Management

Matilda has an existing Archaeological Chance-Find Procedure whereby mine personnel are instructed to cease work and contact the HSEC Officer if suspected archaeological material is uncovered during earthworks. Staff are also made aware of the possibility of grave sites in the area, through the site induction process.

Matilda will communicate the conditions of the AAPA clearance certificates for the ALA site to staff and contractors.

As there are no known archaeological or historic sites in the vicinity of the ALA or mine site, no further management actions are considered necessary.

7.4 Commitments

Matilda commit to communicating the possibility of grave sites in the area to mine staff, through the site induction process.

Matilda commits to instructing mine personnel to cease work and contact the Matilda HSEC Officer if a suspected grave site or any archaeological material is observed. The HSEC Officer will contact NRETA Heritage Conservation Services or the TLC for advice, before giving approval for works to proceed.

Section 8

Air Quality and Noise

8.1 Existing Noise Conditions

The Andranangoo mine site is located in a remote area of Melville Island, distant from any established communities; Milikapiti is the closest community, at approximately 25 kilometres to the west.

Matilda's current mining operation at Andranangoo operates mainly during daylight hours, although the processing plant continues running throughout the night. Machinery used in mining operations includes excavators, loaders, a water cart and dump trucks at the mine site. There is also one haul truck that transports mineral concentrate to Port Melville two to four times a day, and seven 4WD vehicles in regular use in and around the mine site, or on roads between the mine site and the existing ALA's on the island.

As described in Sections 2 and 3, Matilda currently utilises commercial flight services to Pickertaramoor and Garden Point, at a rate of three to five fixed wing aircraft per week. This represents another source of noise attributable to the mining operation.

8.2 Noise Impacts of the Project

Construction of the ALA is expected to take four to six weeks, and will engage heavy machinery such as a bulldozer, roller and grader. Construction activities will be undertaken during daylight hours only, and are therefore expected to create only a relatively minor, localised noise impact. Some disturbance may be caused to local fauna, and this is likely to be comparable with the noise impact of roadworks that already occur regularly across Melville Island.

During operation of the ALA, it is anticipated that three to five fixed wing planes per week would land at Andranangoo. All flights would be during daylight hours, except in exceptional circumstances such as medical emergencies. This level of aircraft traffic is also unlikely to cause a significant noise impact, and would only disturb local fauna on a short-lived, localised basis.

8.3 Noise Management

As mentioned above, noise impacts to local fauna will be minimised by conducting construction and most operational activities at the ALA during daylight hours only unless there is an emergency situation. It is not expected that any other specific management actions will be required for noise at the ALA.

Matilda has an existing Dust and Noise EMP, which contains directions to operate during daylight hours, to fit silencers to excessively noisy machines where possible, and to implement a noise monitoring program if emissions rise to an unacceptable level. This EMP is also proposed to apply to activities at the ALA.

8.4 Existing Air Quality

Smoke during the dry season is probably the single highest contributor to air pollution on the Tiwi Islands at present. The native vegetation on the island, particularly along roads between the communities, is burnt regularly in low intensity fires, for dry season fuel reduction (TLC 2004). These fires cause an extensive smoke haze that can cover the Islands.

Dust from unsealed roads is also a localised contributor to dust levels in communities, in particular on dry and windy days (TLC 2004). A water cart is present when road maintenance activities are being completed.

Matilda's existing mining operation contributes minor volumes of diesel emissions from power generators and machinery, and produces some dust through excavation of dry sands and vehicle movement on unsealed roads. The mineral sands processing plant, which is a wet separation process, does not produce air emissions.

Section 8

Air Quality and Noise

8.5 Air Quality Impacts of the Project

Matilda currently conducts limited fuel reduction burning around the Andranangoo mine site once a year to minimise the risk of wildfires during the dry season. As the ALA project will essentially increase the footprint and perimeter of the operational area, a corresponding increase in fuel reduction burning is likely to result. However, fire is already a common occurrence throughout Melville Island and this small increase in smoke emissions is unlikely to be a nuisance to communities, or a significant disturbance to wildlife.

During the construction of the ALA, dust emissions may be generated through vegetation clearing and earthworks. The impacts of this dust are likely to be localised and short-lived. When required for dust suppression or compaction Matilda will utilise a water cart and wet down the work area.

In the operation phase, the ALA will be maintained with a compacted gravel surface, and dust from aircraft and vehicle use of the ALA is expected to be low. However, Matilda has a water truck at the mine site, which would be available for dust suppression if required. Maintenance activities such as grading and reshaping of surface water drains along the edges of the Runway Strips may create small volumes of dust.

8.6 Air Quality Management

Fuel reduction burning is considered a preventative measure to minimise the risk of large wildfires, and as such some low intensity burning around the perimeter of the ALA is a management measure to minimise potential smoke emissions from the site. The ALA will be incorporated into Matilda's existing Fire EMP (presented in Section 17.10).

Dust suppression activities, such as wetting down cleared areas and stockpiles, may be applied during construction of the ALA, if nuisance dust levels are particularly high.

It is not anticipated that the ALA will create significant air quality impacts during operations, however Matilda has a water truck at the mine site that could be used for dust suppression if required.

Matilda has an existing Dust and Noise EMP, which indicates that fuel reduction burning would be carried out as required, and that dust emissions would be monitored and controlled (where possible) if complaints from the community were received. These strategies would also apply to the ALA.

8.7 Commitments

Matilda commits to conducting ALA construction during daylight hours only.

Matilda commits to incorporating the ALA into Matilda's existing Fire Management Plan to minimise the risk of large wildfires that could cause intense smoke.

Section 9

Traffic and Transport

9.1 Existing Conditions

Matilda's existing transport arrangements are described in Section 2.8. The following describes transport facilities on the Tiwi Islands in greater detail, as well as describing the impacts of the ALA project and their proposed management.

9.1.1 Road transport

The road network on Melville Island consists of unsealed roads connecting communities, and servicing forestry, mining and other commercial operations throughout the island. Traffic on these roads includes small private vehicles, trucks carting fuels and supplies to operational areas (including the plantations and Matilda's mineral sands mine) and haul trucks carting products (e.g. timber and mineral sands) to Port Melville.

Roads require regular maintenance, as heavy wet season rains often result in erosion and degradation of the road surface. Heavy vehicle traffic, such as haul trucks, contributes the largest amount of damage to road surfaces. Road maintenance vehicles (such as graders and rollers) are often present on roads throughout the island and Matilda regularly contracts the TILG to complete repairs to the Andranangoo haul road.

Matilda currently transport mine personnel, contractors and visitors from Darwin to the Andranangoo mine site via fixed wing aircraft to the existing ALA's at Picketaramoor and Garden Point, and then by road in 4WD vehicles. The one-way trip from Picketaramoor to Andranangoo is 100 km and takes about 90 minutes, while the trip from Garden Point is 150 km and takes around two hours.

Haulage of mineral sand concentrate from Matilda's Andranangoo mine site began in early 2007. One haul truck of 60 tonne capacity is used to cart the concentrate to Port Melville, a distance of 153 km. The return trip from Andranangoo to the port takes around five hours, and depending on need and road conditions the truck completes two to four return trips per day.

9.1.2 Air transport

There are eight existing ALA's on the Tiwi Islands, as follows:

- Picketaramoor (Melville Is);
- Milikapiti (Snake Bay, Melville Is);
- Pirlangimpi (Garden Point, Melville Is);
- Rolla Plain (Melville Is);
- Maxwell Creek (Melville Is);
- Nguui (Bathurst Is);
- Port Hurd (Bathurst Is); and
- Ranku (Bathurst Is).

Light aircraft traffic to the Tiwi Islands consists of daily flights to Pirlangimpi and Milikapiti ALA's, run by Tiwi Travel and Freight. Regular flights are also directed to other ALA's for business and private travel to communities, by charter companies such as Direct Air and Hardy Aviation. Workshops and fuel stores for these aircraft are all located in Darwin. Planes fly to the Tiwi Islands and generally return directly, with minimal time spent on the ground.

Matilda staff routinely fly to and from Picketaramoor around three to five times per week, using chartered aircraft. On rare occasions, Matilda may purchase tickets on existing flight services to Maxwell Creek, Milikapiti or Pirlangimpi; these trips require longer driving times from Andranangoo.

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Traffic and Transport

Matilda also use aircraft to transport perishable supplies (food) to the Andranangoo mine site. Food items are frozen where possible (e.g. for meat and dairy products) and packed in eskies or grocery bags. These are transported via plane and then by 4WD vehicle to the mine site.

9.1.3 Sea transport

Barge services from Perkins Shipping Group (Perkins) and the Tiwi Barge Service run from Darwin to established barge landings at Milikapiti and Garden Point on a weekly basis. These barges ferry bulk goods and supplies to communities, and to forestry and mining operations. All goods are unloaded by PenSyl Pty Ltd and loaded onto trucks for transport around the Islands.

Formal procedures have been put in place at both the Tiwi Barge Service and Perkins to ensure that all equipment being transported to the Islands is inspected and signed-off by an Inspection Officer from NRETA, to minimise the risk of transport of pests and weeds.

The one-way barge trip from Darwin takes around 18 hours. The Tiwi Barge Service returns to Darwin after reaching the Tiwi Islands, while Perkins continues on to other Island ports in the region, completing a week-long circuit.

Matilda regularly utilises the barge service for bulk goods and consumables such as fuel, vehicles, and equipment for construction and maintenance activities at the mine. Supplies for the camp including dry, packaged foodstuffs, are also transported via barge.

9.2 Impacts of the Project

The original EIS for the current mining operation (URS 2006a) proposed to use existing road and ALA facilities on Melville Island for transporting goods and personnel between Darwin and the mine site. As described in Section 1.4, over the 2006-2007 wet season it became apparent that this transport system is not feasible due to the following:

- Safety risks to mine personnel through lack of a rapid evacuation system;
- Health and safety risks (worker fatigue) due to excessive travel time to the site;
- Poor road conditions, and road closures, during the wet season; and
- Risk of weed spread from driving through weed-infested areas near Pickertaramoor.

The full extent of these impacts was not predicted prior to submission of the original EIS and the commencement of mining at Andranangoo.

Following construction of the proposed ALA at Andranangoo, Matilda's requirement to travel by road between the mine site and the ALA's at Pickertaramoor and Garden Point will be removed. Wet season road conditions and potential road closures will no longer isolate the mine site, for routine or emergency travel.

The costs and inherent safety risks involved in long travel times across the island will be greatly reduced, as will the fuel consumption associated with this travel (Greenhouse Gas issues are discussed in Section 11). In addition, the risk of weed spread from a known infested area (Pickertaramoor) to site will be reduced.

Road impacts during construction are also likely to be very minimal, as most of the equipment used in clearing and surfacing for the ALA is already in use at the mine site. Some machinery from TILG road maintenance crews may also be engaged in ALA construction.

The level of aircraft traffic flying between Darwin and Melville Island is not anticipated to change as a result of Matilda's use of the ALA at Andranangoo.

Section 9

Traffic and Transport

In the long term, the ALA can be used by the TLC to provide access to the Andranangoo area of the island, which may allow for development of business facilities such as a fishing camp. In this case, the overall aircraft traffic to the Tiwi Islands could increase slightly to support this new opportunity for industry.

The ALA at Andranangoo is unlikely to have an impact on Matilda's current use of the barge services to Melville Island; bulk goods and non-perishable camp items would still be transported via barge, and then via road across the island.

After the completion of mining at Andranangoo, Matilda anticipates that a second mine at Lethbridge Bay West would operate for only one year, which would not justify the construction of an additional ALA at the site. Also, the topography and drainage within 30 to 40 kilometres of that site is not suitable for an ALA. Matilda is still exploring at Lethbridge Bay West and further discoveries could provide new information which may influence the feasibility of transport options.

9.3 Management

During ALA construction, minimal impacts are anticipated on road traffic as machinery will be sourced from the existing mining operations where possible. Matilda's existing procedures for traffic management, such as avoidance of weed infested areas to prevent weed spread, will also apply to this project. The density of vehicle traffic to and from the mining area during construction, operation and maintenance of the proposed ALA is not considered to warrant any additional traffic management.

Currently, all heavy machinery is transported to site and haulage vehicles operate under Matilda's subcontractor (NRW, TILG or other) who is responsible for ensuring compliance with regulations and standards.

A thorough stakeholder consultation process has been undertaken in development of this PER to identify any community issues for the project; no concerns were raised by the Tiwi people about traffic and noise impacts from the ALA construction or operation.

The health and safety issues of driver fatigue have been documented in Matilda's risk register and are managed according to the *Northern Territory Transport Code of Practice, Fatigue Management 2001*. The risks associated with worker fatigue would be further minimised through installation of the Andranangoo ALA, as the requirement to travel to distant ALA's would be removed.

9.4 Commitments

Matilda will impose existing traffic management procedures, such as avoidance of weed infested areas, during ALA construction.

Section 10

Waste and Hazardous Substances

10.1 Waste Streams

10.1.1 Construction waste

During the construction phase of the ALA, vegetation will be cleared to ground level and pushed into discrete heaps. Topsoil will also be removed and heaped in this process, to allow for a flat Runway surface that can be covered with gravel and compacted.

At this stage, the ALA is intended to become a permanent facility at Andranangoo therefore the vegetation debris will be burnt to remove dead trunks and branches from the area. However, if rehabilitation of the ALA is required, as identified in the PER assessment process, then cleared vegetation would remain in stockpiles for respreading on the site during the rehabilitation process as described in Section 2.6.2.

10.1.2 Inert operational waste

Waste streams created during the operational phase of the ALA will be very minimal, limited to domestic rubbish brought from vehicles and aircraft by personnel travelling through the ALA, and packaging waste associated with goods transported to site via aircraft.

All inert waste will be collected and removed from the ALA, for disposal in the existing landfill facility at the Andranangoo mine site. Waste in this landfill is burnt, and then covered with soil to prevent access by wildlife, in accordance with Matilda's Waste EMP (presented in Section 16.6).

10.1.3 Hazardous operational wastes

Hazardous wastes created at the ALA are anticipated to be in very small volumes, as refuelling and servicing of construction machinery and operational aircraft will be performed off site, at the mine site or at the airport in Darwin, respectively.

At the Andranangoo mine site, waste oil, oil filters and rags are collected in 205 litre drums, and labelled as oily wastes. On site these drums are stored on the fuel storage bund and transported as waste oil off site for storage at an oily waste storage facility at Port Melville, before shipping to the mainland for appropriate disposal. Waste storage drums are inspected monthly in accordance with Matilda's Hydrocarbons and Hazardous Substances EMP (presented in Section 16.7).

10.2 Hazardous Substances

10.2.1 Storage and handling

During construction and maintenance of the ALA, refuelling and servicing of machinery and equipment will be carried out at the workshops at the Andranangoo mine site. Fuel, oils and lubricants are stored in a dedicated bunded storage facility, and handled in accordance with the existing Hydrocarbon and Hazardous Substances EMP (Section 16.7), which refers to Australian Standard 1940 for *Storage and Handling of Flammable and Combustible Liquids*. In accordance with this standard, fuels are stored in bunded areas, established hydrocarbon transfer procedures are followed to minimise spills, and spill response materials (spill-kits) are available on site.

During the operational phase, it is not proposed to handle or permanently store aircraft fuels in or around the ALA. It will be the responsibility of charter aircraft operators to conduct refuelling at Darwin Airport, prior to commencing the return trip to the ALA.

For exceptional circumstances where refuelling is necessary, such as for emergency use or when light aircraft are used in exploration activities for two or more consecutive days, small volumes of aviation fuel (e.g., two or three 205 litre drums) will be stored on the existing fuel storage bund at the mine site, as noted in Section 2.10. Matilda would store and handle aviation fuel in accordance with the existing

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Waste and Hazardous Substances

Hydrocarbon and Hazardous Substances EMP, similarly to other fuels, oils and hazardous substances used regularly in operations at the mine site.

10.3 Management

As described above, Matilda is currently operating under an existing Waste EMP and a Hydrocarbons and Hazardous Substances EMP (presented in Section 17.4 and 17.5 respectively), which outline the management actions and objectives for disposal of wastes, and for handling, storage and disposal of hazardous substances at the Andranangoo mine site. These EMP's have been revised to incorporate the waste and hazardous substances issues associated with construction and operation of the proposed ALA.

In terms of the proposed ALA, the most relevant management actions included in these EMP's are as follows:

- Vegetation debris and topsoil removed during ALA construction will be piled in two or three heaps, and either burnt to remove trunks and dead wood from the site, or retained for later rehabilitation of the ALA;
- All inert waste (eg, domestic rubbish, packaging) will be collected from the ALA and disposed of in the Andranangoo landfill facility, where wastes are periodically burned and covered with soil;
- All fuels, oils and lubricants used to service machinery during construction and maintenance of the ALA will be stored at the Andranangoo mine site, in existing bunded storage facilities established for the purpose;
- No aviation fuel is proposed to be handled or permanently stored at the ALA site. For emergency or rare circumstances, small volumes (two or three 205 litre drums) of fuel would be stored at the existing bunded storage facilities at the Andranangoo mine site; and
- Waste oils will be stored in labelled drums and removed from the Andranangoo mine site for transport back to Darwin, and disposal at a licensed facility.

10.4 Commitments

Matilda commits to applying the management actions included in the existing Waste EMP and Hydrocarbons and Hazardous Waste EMP to the construction and operation of the ALA.

Matilda will not store any fuel or oil at the ALA site, and only small volumes of fuels or oils required for aircraft for emergency or special circumstances will be stored at the existing bunded facility at the mine site.

Matilda commits to piling vegetation debris and topsoil removed during ALA construction into heaps to minimise impacts to the surrounding vegetation. These heaps would either be burnt or retained for later rehabilitation of the ALA, should the decision be made during the PER process to remove the ALA after completion of mining.

Section 11

Greenhouse Gases

This section provides an estimate of the greenhouse gas emissions produced by the proposed ALA project, through land clearing, construction, operation and potential rehabilitation. An assessment of the greenhouse gas emissions produced by the main alternative forms of transport to Andranangoo (charter aircraft to the existing ALA's, and helicopter to site) is also provided.

11.1 Construction

11.1.1 Fuel and energy requirements

Construction of the ALA is expected to take two to four weeks, and will engage the following machinery:

- a bulldozer in land clearing;
- a grader and water truck, for topsoil removal, gravel binding and replacement of surface material;
- a heavy roller in compacting the surface.

All machinery will run on diesel fuel. In order to estimate the greenhouse gas emissions from these activities, the full fuel cycle emissions factor for automotive diesel fuel from the Australian Greenhouse Office (AGO) *Factors and Methods Workbook 2006* has been used (Table 11.1). Approximate fuel consumption rates have been entered for the purposes of this PER, however it is noted that this is based on anecdotal knowledge of fuel use by heavy machinery and is not referenced by an authority.

ALA construction activities are estimated to produce a total of 59.6 tonnes CO₂^e.

Table 11-1 Greenhouse gas emissions from ALA construction activities

Activity	Hours	Diesel consumption per hour (L)	Full fuel cycle emission factor (t CO ₂ ^e /kL)	Total CO ₂ ^e emissions (t)
Clearing				
Bulldozer	80	35	3.0	8.4
Grader	36	20	3.0	2.2
Remove topsoil				
Grader	300	20	3.0	18
Water truck	300	18	3.0	16
Borrow pit, dumping, compacting ALA				
Grader	100	20	3.0	6.0
Water truck	60	18	3.0	3.2
Roller	130	15	3.0	5.8
TOTAL				59.6

11.1.2 Land clearing

Greenhouse gas emissions from the land clearing associated with ALA construction have been estimated using the FullCAM Carbon Accounting Model (AGO 2005). The FullCAM model provides an estimate of the total greenhouse gases (in tonnes CO₂^e) produced per hectare of land clearing, depending on the location within Australia. The model is built on input from Australia-wide soils databases, climatic profiles, and Landsat imagery that assesses vegetation types; therefore, it provides an estimate only. However,

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FullCAM is approved for use in greenhouse emissions accounting by the Australian Government, and is a useful tool in place of accurate scientific studies of organic carbon in soils and vegetation on site.

It is noted that these greenhouse emissions from land clearing are assumed to be a “one-off” event, not an annual rate of emissions.

Land clearing at the ALA Runway area and the Approach and Take-Off areas are described below.

Runway area

In construction of the ALA, the Runway, Runway Strips and Fly-Over areas (Figure 2.2) will be completely cleared and surfaced with compacted gravel, representing a total area of nine hectares of vegetation removal (Section 2.3.1).

The FullCAM model suggests that at the ALA site on the Tiwi Islands, land clearing will result in greenhouse emissions of 147 tonnes CO₂^e per hectare, representing the decomposition of vegetation, litter and soil organic matter (AGO 2005). This figure does not take into account burning of vegetation debris after removal.

The total greenhouse emissions from this clearing are 1,323 tonnes CO₂^e, as shown in Table 11.2.

Approach and Take Off areas

As described in Section 2.3.1, Approach and Take-Off areas will be maintained at either end of the ALA, where tall vegetation will be cleared on a slope of 3.3% from the ends of the Runway. As the maximum vegetation height in the area is approximately 20 metres (Metcalf 2007a, Appendix D), and given the dimensions of the ALA (presented in Figure 2.2), it can be calculated that the total area affected by this clearing is 7.4 hectares (3.7 hectares at each end of the ALA, see Section 2.3.1).

In estimating the greenhouse gas emissions from this partial clearing, it is assumed that one third of the site's organic matter exists below ground, and two thirds above ground. Removing large trees and tall shrubs on an even slope, from ground level to the tops of the tallest trees, could be assumed to remove approximately one third of the above-ground biomass for that area, as the leaf litter layer, grass, lower-strata and most of the mid-strata of vegetation will not be impacted by these partial clearing activities. These are estimates only, and are not referenced to a particular authority.

Using the above assumptions, it is estimated that the 7.4 hectares of partial clearing necessary for the ALA site will result in the emission of 242 tonnes CO₂^e, as presented in Table 11.2.

Table 11-2 Greenhouse gas emissions from land clearing for the Andranangoo ALA

	Area (ha)	Emissions per hectare (t CO ₂ ^e /ha)	Total (t CO ₂ ^e)
Runway area (total clearing)	9.0	147	1,323
Approach/Take-Off area (partial pruning, above ground only)	7.4	32.7*	242
TOTAL			1,565

* Assume 147 t CO₂^e /ha if completely cleared. 147 x 2/3 above ground x 1/3 affected by pruning = 32.7 t CO₂^e

11.2 Operations

11.2.1 Fuel requirements

The greenhouse gas emissions associated with light aircraft travel from Darwin Airport to the Andranangoo ALA can be calculated using the full fuel cycle emissions factor for aviation gasoline provided by the AGO (AGO 2006). Estimated fuel consumption rates were derived through

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communications with Direct Air, the aircraft charter company, based on previous experience with similar flights. Calculated emissions are provided in Table 11.3.

The total greenhouse emissions for a return trip from Darwin to Andranangoo ALA are 0.30 tonnes CO₂^e.

11.2.2 Comparison with other transport alternatives

There are two other main alternatives for transport to the Andranangoo mine site, described in detail in Section 3, as follows:

- light aircraft travel to the existing ALA's and road transport to site; and
- helicopter travel direct to the mine site.

For the purposes of this PER, the greenhouse gas emissions attributable to these alternative forms of transport can be calculated for comparison with Matilda's proposed direct travel to site. Emissions have been calculated using the full fuel cycle emissions factor for aviation gasoline and for automotive diesel oil provided by the AGO (AGO 2006). Estimated travel times have also been used in the calculation (Direct Air, *pers comm.*, Jayrow, *pers comm.*), which are presented in Table 11.3.

The total greenhouse emissions for a return trip from Darwin to Andranangoo via light aircraft to the existing ALA at Pickertaramoor (and 4WD return to the mine site) are 0.42 tonnes CO₂^e, and for helicopter travel to site are 0.60 tonnes CO₂^e. Over the life of the mining operation, a further three years (156 weeks), there would be approximately four trips per week; therefore total emissions for light aircraft via Pickertaramoor would be 262 tonnes CO₂^e, and for helicopter travel (six seater) 34 tonnes CO₂^e.

It is noted that the emissions estimates for 4WD transport do not account for transporting fuel to the island via barge, and to site via tanker. Including these emissions would increase the carbon footprint of this transport option.

Table 11-3 Greenhouse gas emissions for one return trip from Darwin to Andranangoo ALA

Activity	Hours (return trip)	Fuel consumption (L/hr)	Full fuel cycle emission factor (t CO ₂ ^e /kL)	Emissions per trip (t CO ₂ ^e)	Total emissions** (t CO ₂ ^e)
Light aircraft flight – Darwin to Andranangoo	1.0	120	2.5 (av gas)	0.30	187
Light aircraft flight – Darwin to Pickertaramoor:					
(Light aircraft	1.0	120	2.5 (av gas)	0.30)	
(4WD road transport	3.0	13	3.0 (diesel)	0.12)	
Total				0.42	262
Helicopter flight* – Darwin to Andranangoo	1.6	150	2.5 (av gas)	0.60	374

* Includes estimated fuel use for a helicopter seating six people (five passengers)

** Assumes 4 trips per week, for 156 weeks

11.3 Decommissioning

As described in Section 2, it is proposed that the ALA remains as a permanent facility for use by the Tiwi people after closure of the Andranangoo mine. Alternatively, Matilda will rehabilitate the ALA if that is identified as the preferred management option through consultation with the TLC, and through the approval conditions of this PER.

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Revegetating the ALA site would reduce the greenhouse impact of the project by sequestering atmospheric carbon back into new vegetation. Rehabilitation with native species may return carbon stores in the vegetation and soil back to the level at the time of clearing, however this potentially “carbon neutral” result needs to be adjusted to allow for the energy involved in removing hard surfaces such as the Runway area and access road, ripping the sites, seeding of the site and on-going monitoring.

For the purposes of this PER it is assumed that these works will reduce the recovery of the original CO₂^e emissions by 20%. Given that 1,565 tonnes CO₂^e were produced by land clearing, rehabilitation could sequester 1,252 tonnes CO₂^e, as shown in Table 11.4.

If the ALA is to be retained as a permanent facility, this carbon sequestration would not apply and the greenhouse gas footprint would be equivalent to the construction emissions plus the ongoing emissions from operation of the ALA.

11.4 Whole of Life Carbon Footprint

The whole-of-life greenhouse gas emissions from the ALA project were calculated by adding the following components:

- Construction emissions, including land clearing and operation of machinery;
- Operation emissions, assuming a fixed average number of trips between Darwin and Andranangoo per week for the remainder of the life of the mining operations, at the end of 2010 (that is, a total of 156 weeks); and
- Potentially, the sequestration associated with revegetation of the ALA (or alternatively, no rehabilitation, and handover to the Tiwi people in an operational state).

It is noted that a number of complexities relating to the “Operation emissions” have not been included in these simplified calculations. The following are other considerations that affect the greenhouse gas emissions of Matilda’s transport arrangements:

- on occasions when large numbers of personnel are travelling, more than one 4WD vehicle may be required to take them to the ALA;
- where larger helicopters are not available for charter, Matilda would have to use smaller helicopters and perform a larger number of trips, using more fuel;
- wet season road closures would force Matilda to use helicopters instead of 4WD vehicles. Therefore a “whole-of-life” calculation of emissions for the use of existing ALA’s (and 4WD to site) would, in reality, have to be increased to account for this inevitable helicopter use; and
- there are extra fuel emissions involved in bulk diesel transport from Darwin to Andranangoo (via barge and haul trucks). These “imbedded” emissions have not been accounted for in the transport option involving 4WD transport across the island.

A summary of the whole-of-life carbon footprint is provided in Table 11.4; total emissions are 560 tonnes CO₂^e if the ALA is rehabilitated and 1,812 tonnes CO₂^e if it is not. These figures include operational emissions of 187 tonnes CO₂^e for three years.

This level of greenhouse gas emissions can be considered minor in comparison to other infrastructure, forestry, transport and industrial projects in the NT, and around Australia.

It is noted that the greenhouse gas emissions associated with continuing the current arrangement of flying to the Pickertaramoor ALA and driving to Andranangoo would be 262 tonnes CO₂^e, as no land clearing would be required.

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Table 11-4 Whole of life greenhouse gas emissions from the Andranangoo ALA

Project stage	Greenhouse gas emissions (t CO ₂ e)
Vegetation clearing	1,565
Construction	60
Operations **	187
Total with handover to TLC	1,812
Rehabilitation	-1,252
Total with rehabilitation	560

** Assuming 0.3 t CO₂e/trip, with 4 trips per week for 156 weeks

11.5 Management of Greenhouse Gases

Land clearing during construction will be guided by hand held GPS units so as to accurately define clearing borders, and to avoid accidental over-clearing.

With regard to operation of the ALA, Matilda will coordinate flight schedules as efficiently as possible to minimise the number of light aircraft flights per week, and to utilise larger (e.g. five or nine seater) planes that are more efficient in fuel use, on a per passenger basis. It is noted that helicopters produce higher levels of greenhouse gases than small aircraft, and Matilda would only engage helicopters for travel to site when necessary for specific tasks, or for emergencies.

Matilda currently reports to the National Pollution Inventory on greenhouse gas emissions, as the existing mining operations trigger emissions thresholds for diesel use.

11.6 Commitments

Matilda commits to using hand-held GPS units to identify clearing boundaries during construction of the ALA, to avoid accidental over-clearing.

Matilda commits to coordinating flight schedules as efficiently as possible to minimise the number of flights per week, and to utilise larger planes that are more efficient in "per passenger" fuel use.

Matilda has joined the Greenhouse Challenge and commits to continuing to reduce greenhouse emissions where possible.

Section 12

Biting Insects

12.1 Background

Mosquitoes are a potential public health issue in the NT, both as pest insects and as vectors of a number of diseases including the potentially fatal Murray Valley Encephalitis Virus (MVEV), the Kunjin Virus (KV), Ross River Virus (RRV) and Barmah Forest Virus (BFV). Therefore a biting insect evaluation is required under the planning provisions of the NT Government to consider the impact of any development proposal on biting insect populations, and the risks of biting insects to the workforce at any new site (Warchot and Whelan 2005).

During the EIS process for Matilda's mining operation, URS commissioned a biting insect survey of the Andranangoo mining area. This work was undertaken by the Medical Entomology Branch of the DHCS (see Appendix H for full reports; Warchot and Whelan, 2005, and Warchot and Whelan, 2007).

The proposed ALA will be located on a laterite escarpment, directly south of the Andranangoo mine site, approximately 600 to 900 metres from surface water. The surface water in the vicinity of the site could be expected to provide breeding sites for a number of mosquito species such as the salt marsh mosquito *Ochlerotatus vigilax*, the common banded mosquito *Culex annulirostris* and the North Australian malaria mosquito *Anopheles farauti* s.l (Warchot and Whelan 2005).

Biting midges can also be considerable pests within a few kilometres of the coast in the NT; they can cause painful bites, and indirect effects due to secondary infections. As the Andranangoo mine site (and the proposed ALA) is located adjacent to tidal mangrove creek areas, it was considered a possibility that biting midges could be present in the area, in particular the mangrove biting midge *Culicoides ornatus* (Warchot and Whelan 2005).

Biting insect trapping was conducted at Andranangoo by DHCS and Matilda in September and November 2005, and January and May 2006. Sampling methodologies for the surveys and full results are provided in Appendix H.

Investigations and post-survey work by DHCS have included:

- Surveys of the environment around the site to identify possible sources of biting insects both through field investigations and examinations of aerial photography;
- Assessment of the potential for the creation of new mosquito breeding sites as a result of mining activities;
- Establishment of pre-, during- and post-wet season mosquito monitoring programs, which were conducted by Matilda staff;
- Provision of guidance on how to prevent the creation of new mosquito breeding sites at the mine site; and
- Provision of information on how to reduce biting insect populations and prevent mosquito-borne disease transmission at the development sites (Warchot and Whelan 2007).

12.1 Existing conditions

12.1.1 Mosquitoes

A variety of mosquito species were trapped in the site surveys, in various abundances, at sample sites around Andranangoo Creek West. Table 12.1 lists the main species identified in the four sample events, along with the proportion of each species compared with the totals for each sampling event.

As shown, higher numbers of mosquitoes were trapped during the September 2005 and May 2006 dry season surveys than in the wet season, November 2005 and January 2006.

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Table 12-1 Mosquitoes trapped in baseline surveys at Andranangoo Creek West

Species	Date of Survey			
	29 th September 2005	1 st November 2005	13 th January 2006	12 th May 2006
<i>Ochlerotatus vigilax</i>	59%			
<i>Culex annulirostris</i>	24%	2.6%	2%	6.3%
<i>Coquillettidia xanthogaster</i>	6%			6.2%
<i>Anopheles bancroftii</i>	4%			5.7%
<i>Culex sitiens</i>	3%	3%	2%	
<i>Anopheles farauti s.l.</i>	1%	1.6%	7%	36.8%
<i>Aedes vigilax</i>		85%	85%	
<i>Anopheles hilli</i>		5%		
<i>Mansonia uniformis</i>				37.3%
Other (various species)	3%	2.8%	4%	7.7%
Total mosquitoes trapped	3897	2286	800	3193

12.1.2 Biting midges

A variety of biting midge species were recorded during the four trapping events at Andranangoo Creek West. The main species and their relative abundance on each night are shown in Table 12.2.

The dry season trapping results of September 2005 and May 2006 revealed significantly higher overall biting midge numbers compared to the wet season samples in November 2005 and January 2006.

Table 12-2 Biting midges trapped in baseline surveys at Andranangoo Creek West

Species	Date of Survey			
	29 th September 2005	1 st November 2005	13 th January 2006	12 th May 2006
<i>Culicoides (Mar grp) marksii</i>	56.5			<1
<i>Culicoides (Orn grp) ornatus</i>	3.4	31	55	73
<i>Culicoides (Orn grp) undescribed species No 6</i>	30.4	7		4
<i>Culicoides (Wil grp) austropalpalis</i>	1.3	7		<1
<i>Culicoides unidentifiable</i>	8.3	4		3
<i>Lasiohelia sp.</i>	0.1		3	<1
<i>Culicoides (Mei) guttifer</i>		51		
<i>Culicoides (Orn grp) cordiger</i>				

Section 12

Biting Insects

<i>Culicoides (Orn grp)</i> <i>papuensis</i>				
<i>Culicoides (Vic grp)</i> <i>bundyensis</i>				13
<i>Culicoides (Vic grp)</i> <i>undescribed sp Vic 42</i>			31	
<i>Culicoides (Vic grp)</i> <i>pallidothorax</i>			10	
<i>Culicoides (Wil grp)</i> <i>narrabeenensis</i>				6
Total midges trapped	1115	45	29	1222

12.2 Impacts and Issues

12.2.1 Mosquitoes

The ALA will not impact on natural surface water flows, soils or vegetation around the existing mosquito or midge breeding sites in the area, such as the Andranangoo swamp, Andranangoo spring and the seasonal drainage lines located in the sand dune areas.

Surface water drains installed around the perimeter of the ALA could potentially provide new mosquito breeding sites, if pooling water remains there for any extended period.

With regard to disease risk, the mosquito species *Aedes vigilax* is a known vector of RRV and BFV, and could pose a risk to personnel at the ALA during November to January, and possibly into February. The species is a significant pest mosquito, and can bite in shaded areas during the day, and throughout the night. *Culex annulirostris* can also transmit RRV and BFV, as well as KUNV and MVEV, and would be a risk from December to July (Warchot and Whelan 2007).

The pest potential and disease risk of the variety of other mosquitoes identified at Andranangoo are described in full in Appendix H.

12.2.2 Biting midges

Culicoides ornatus is the only biting midge species expected to cause a pest problem at Andranangoo, particularly within two kilometres of the mangrove margin, which is relevant to the ALA area. Warchot and Whelan, 2007, suggest that the highest pest problems can be expected from August to November, during the two hours either side of sunset and sunrise. Moderate pest problems can also be expected in the late wet/early dry season (April to May) at Andranangoo (Warchot and Whelan 2007).

12.3 Management

To minimise the risk of creating new breeding sites at the ALA, surface water drains with regular turn-outs into surrounding vegetation will be installed along the edges of the Runway Strips. These drains will remove surface water runoff as quickly as possible during heavy rain events, with minimal pooling. In accordance with the DHCS *Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites*, sediment traps and drains will be constructed so as to remove surface water within five days after a high rainfall event. Silt and any vegetation regrowth will be removed from these drains on an annual basis.

If the ALA is rehabilitated after closure of the Andranangoo mine site, the surface water drains and turn-outs will be removed and the land surface restored to the natural drainage pattern.

Section 12

Biting Insects

Mine personnel and visitors using the ALA will continue to be advised to remain indoors in the mine camp around sunrise and sunset, and during the night to avoid times when pest insect numbers increase. Insect repellent and insect sprays will be provided to all personnel and visitors.

It is not anticipated that insecticide control of biting insects will be required at the ALA; personal protective measures should be sufficient as people move between aircraft and mine vehicles. If there are any cases of mosquito borne diseases, Matilda may need to control the area by fogging and undertaking subsequent entomological investigations.

Matilda current operates under an existing Biting Insects EMP associated with operations at the mine site. This EMP has been revised to include biting insects issues associated with the ALA, such as design of the surface water drains, and provision of advice on personal protective measures to all visitors arriving at the ALA (see Section 17.11).

12.4 Commitments

Matilda commits to constructing the ALA in accordance with the DHCS Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites.

Matilda commits to continuing to provide advice on biting insect risks and personal protective equipment (such as insect repellent) to all mine personnel and visitors.

Section 13

Socio-Economics

13.1 Regional Socio-Economic Conditions

There are three main communities on the Tiwi Islands (Figure 1.1):

- Milikapiti (Melville Island).
- Pirlangimpi (Melville Island); and
- Nguui (Bathurst Island);

The small outstation of Wurankuwu, established in 1994, is also located on Bathurst Island, 60 km from Nguui. Other official outstations on Melville Island include Paru, Taracumbie, Condor Point and Takamprimili; these all consist of between one and seven houses, and have no services other than water bores and power generators (TLC 2004).

The estimated residential population on the Tiwi Islands in 2006 was 2,512 people, of which 92.4% were indigenous (ABS 2007). The average age on the Tiwi Islands is 26, which is not uncommon for indigenous communities in Australia (TLC 2006). There are very few non-indigenous children or young adults (less than 25 years of age) on the Tiwi Islands (ABS 2007).

13.1.1 Regional economy

Business enterprises on the Tiwi Islands include forestry, fishing charters, tourism, transport, and arts and crafts. In recent years there have been additional forestry projects proposed, and mineral sands mining and exploration by Matilda Minerals.

In 1999, the TLC assessed the value of the Tiwi economy at M\$25 per year. This comprised M\$11.5 in commercial fishing operations generated by non-Tiwi interests, M\$9.5 from the 'welfare economy' generated by Tiwi people, and M\$4 in enterprise and non-welfare payments accruing to the Tiwi Islands' organisations and business sector (TLC 2004).

The Tiwi Islands Community Trust was set up in 1986 to improve the local economy and reduce dependence on welfare. The Trust set up partnerships in forestry, tourism, cultured pearls and coastal barging, however the risk and marginal profits resulted in all partnerships ending, apart from the Tiwi Barge Service. The tourism joint venture (Tiwi Tours) was purchased outright by the Trust and these continue to do well. Tiwi Pearls was sold and Melville Forest Products was terminated in 1997 (TLC 2004).

Melville Island Lodge (formerly Top End Sportfishing Safaris) is a fishing charter business operating out of Milikapiti. One of the areas frequented for fishing is Goose Creek, located directly east of Andranangoo mining operations. The fishing charter offers accommodation at Milikapiti and also has a campsite at Johnston River which caters for a maximum of six people. The business has been conducting guided fishing and hunting tours since 1986. A second fishing charter business, Munupi Wilderness Lodge operates out of Pirlangimpi (Garden Point) as a similar business.

13.1.2 Employment and income

The unemployment rate on the Tiwi Islands is high, at three times the NT average, and has risen during recent years. Investigations have failed to determine a reason for this; more people may have migrated to the Tiwi Islands recently without employment, or data collection methods may have improved (DEWR 2005).

The majority of the unemployed population are indigenous people. The national Community Development Employment Projects program (CDEP) employs about 68% of the employed indigenous population and about 18% of the employed non-indigenous population on the Tiwi Islands (ABS 2001).

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Socio-Economics

The unemployment rate on the Tiwi Islands is much higher for males (16.1%) than for females (8.9%), for both indigenous and non-indigenous persons. Anecdotal evidence suggests that this may be due to the higher portion of females employed in administrative roles in government offices (ABS 2001).

Of the 606 people who completed the 2001 Census survey, a large majority worked in the government and defence sector (36%). The next highest employers on the Tiwi Islands were health and community services (14%), and education (13%), followed by agriculture, forestry and fisheries (4.46%).

Matilda's Andranangoo mining operation currently employs local Tiwi people where possible; however it should be noted that operations will have a short life and thus the primary employment opportunities for indigenous people are the future opportunities made possible by infrastructure and royalties. Currently, Matilda employs Tiwi Rangers to assist with environmental monitoring and the TILG to complete road maintenance. Matilda has a local employment policy and continues to explore opportunities to provide employment to the Tiwi people, through consultation with the TLC.

13.1.3 Education and training

There are two Catholic schools in Nguui, offering education from pre-school to junior secondary. There is a Catholic primary school at Wurankuwu, and Milikapiti and Pirlangimpi both have NT Government schools offering primary education (Cleary 2005).

Based on the 2006 Census, the majority of people on the Tiwi Islands had not completed schooling past Year 10, particularly in the indigenous population (ASB 2007). The Cleary (2005) report suggests that low education levels may affect the indigenous population's ability to obtain employment across a range of sectors and education is the most important socio-economic issue that needs to be addressed on the Tiwi Islands.

To address the need for further education, the TLC is constructing a Tiwi College that will provide quality secondary education to all young Tiwi Islanders at Pickertaramoor. The Tiwi College will be owned and operated by the Tiwi people through the Tiwi Education Board (TLC 2007). The College curriculum (including science, forestry, literacy, numeracy and sport) will prepare young people with the skills and knowledge they need to participate fully in the future of the Tiwi people. Opening of the College is planned for 2008.

The Tiwi Islands Training and Employment Board coordinates all vocational education and training activities on the Tiwi Islands and offers apprenticeships across a broad range of disciplines. In 2006, 520 Tiwi Island students participated in training including short courses and trades in a variety of areas, including agriculture and tourism (TLC 2005-6). The Board also provides other accredited training that enhances skills and creates pathways to apprenticeships or direct employment in sectors such as child care, health work, small boat handling and first aid (TLC 2007).

13.1.4 Sports and recreation

The main sport and recreational facilities on the Tiwi Islands are located in Nguui, Pirlangimpi and Milikapiti. These include swimming pools, football ovals, golf courses and recreational clubs.

Australian Rules football in particular is very popular on the Islands and on the last Sunday in March every year visitors are permitted to come to the Islands to witness the Tiwi Islands Football League Grand Finals (TILG 2007). The Tiwi Bombers formed and joined the NT Football League in 2006-2007 as a trial run for permanent inclusion in the league.

Fishing is another popular recreational activity undertaken by visitors to the Tiwi Islands. The north coast of Melville Island in particular has become a popular spot for fishing tour operators, and commercial and recreational fishermen. Fishing is permitted in rivers and runways, provided that visitors do not enter onto land without a permit; the TLC has authority to issue land access permits under the *Aboriginal Land Rights Act* (TLC 2004).

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Socio-Economics

13.1.5 Infrastructure

Electricity on the Tiwi Islands is supplied by diesel power stations. Payment operates through a card system, where consumers pre-purchase cards for insertion into individual meters. Domestic water is supplied to communities by production bores or springs, and is of good quality. The principal communities have reticulated sewerage systems, using lagoon treatment.

There are approximately 280 kilometres of unsealed roads on Melville Island, and 250 kilometres on Bathurst Island. These do not include the numerous cultural, hunting and recreational tracks. Sealed roads exist around the Nguui, Pirlangimpi and Milikapiti communities. These three main communities have community-owned and licensed aerodromes with sealed airstrips. As described in Section 9, there are additional (unsealed) ALA's at Pickertaramoor, Rolla Plain and Maxwell Creek on Melville Island; and at Port Hurd and Ranku on Bathurst Island.

Light aircraft transport is regular on the Islands, particularly to Nguui, Pirlangimpi and Milikapiti. The majority of bulk transport to the Tiwi Islands is by shipping, and there are barge landings at Nguui and Port Melville (Pirlangimpi).

Communications on the Islands consist of CDMA mobile phone services and landline telephones available to the main communities. There is a monthly newspaper, the 'Tiwi Times', prepared by the Tiwi Islands Training and Employment Board.

13.2 Impacts of the Project

Construction of the Andranangoo ALA is anticipated to last four to six weeks, and while it will mainly engage equipment and personnel from the existing mining operation, TILG road maintenance crew will be utilised where possible (e.g. grading and compacting of the runway surface). Ongoing maintenance of the ALA will likewise engage current mine site resources or TILG. Tiwi employment opportunities associated with construction of the ALA are only temporary and are of a local scale. Construction of the proposed ALA is not anticipated to have a significant impact on the NT economy in terms of employment, income and production.

The value of construction of the ALA is estimated as \$100,000 and the annual maintenance costs are estimated at \$5,600 per year; this is not considered to provide a significant economic impact to the regional or state economy. However, as described throughout this PER, the TLC has stated that they support construction of the ALA and intend to take over the operation and maintenance of the ALA upon mine closure.

The ALA in conjunction with the mining camp (also an option for the TLC to retain) would provide the necessary infrastructure to allow for ongoing business development such as commercial tourism operations at Andranangoo. The ALA would also provide improved access for emergency response services to the area. This results in a positive socioeconomic impact for the Tiwi people and provides future opportunities for financial independence.

It is anticipated that the increased income generated from a future business venture at Andranangoo upon mine closure would allow for increased annual expenditure on regional goods and services thus increasing the value of current business ventures on the island.

13.3 Management

Matilda will continue to consult closely with the TLC on the construction, management and handover of the Andranangoo ALA. If handover of the facility after mine closure is the preferred option Matilda commits to leaving the ALA in sound operational condition.

Opportunities for engaging the TILG in construction and maintenance of the ALA will be identified and pursued, in consultation with the TLC; however it should be noted that Matilda is constrained by available construction time prior to the wet season and thus subcontractor availability will be the primary deciding factor.

Section 13**Socio-Economics**

Matilda has an existing policy of contributing positively to the socio-economic status of the Tiwi Island people, and maintaining a good business relationship with the Traditional Owners of land in the mining area.

13.4 Commitments

Matilda commits to continuing a close working relationship with the TLC, to identify opportunities to contribute positively to the Tiwi Islands' economy and society.

Matilda commits to leaving the ALA in sound operational conditions at the end of mining, should it be confirmed as a result of this PER process that the ALA should remain as a future asset to the Tiwi Islands community.

Section 14

Stakeholder Consultation

14.1 Aims of Stakeholder Consultation

During preparation of this PER, Matilda conducted comprehensive community consultation with all stakeholders that could be affected by, or have an interest in, the Andranangoo ALA. The objectives of this consultation process were to ensure the interests of individuals, groups and agencies potentially affected by the project were considered and addressed during the environmental assessment process, particularly those of the Yimpinari people on whose land the mine and ALA are operating.

14.2 Consultation Before Preparation of the PER

Extensive community consultation was conducted by Matilda during the environmental approvals process for its Andranangoo mineral sands operation, in 2006.

The main issues in relation to Matilda's sand-mining operations were raised by the Environment Centre of the NT (ECNT), who were concerned about the following:

- clearing large areas of coastal vegetation;
- the potential introduction of foreign pests and diseases;
- impacts on ground water;
- impacts on turtle breeding sites;
- problems with erosion and mine site rehabilitation;
- generation of potentially dangerous radioactive materials that occur in mineral sands deposits; and
- potential contamination from oil and diesel.

The ECNT also expressed concern at the cumulative impact of sand-mining on the ecological values of the Tiwi Islands.

Matilda has developed and implemented a Stakeholder Communication and Consultation Procedure (HSEC Procedure 6.3.1). The procedure outlines the process to be followed to communicate and consult with external parties including regulators, Traditional Owners, shareholders, the general public and other interested parties.

The TLC are considered the primary means for communication with the Tiwi people, as they comprise representatives from each of the clan or "country" groups present on the Tiwi Islands. The TLC was established under the *Aboriginal Land Rights (Northern Territory) Act 1976*, and includes a Chairman and a Management Committee, with up to six representatives from each of eight clans (TLC 2007).

The Secretary of the TLC John Hicks confirmed that 18 minuted meetings were held by the TLC with land owning groups discussing Matilda's mining project, since the first application for exploration leases. All meetings resulted in unanimous support for exploration and sand-mining (John Hicks, *pers comm.*).

Since the commencement of mine planning, Matilda has regularly attended TLC meetings to consult the Traditional Owners and community about activities on site. Dates for the meetings attended are as follows:

- | | |
|-----------------|---------------------|
| • 2 March 2006; | • 6 September 2006; |
| • 6 March 2006; | • 3 April 2007; |
| • 14 June 2006; | • 8 March 2007; and |
| • 21 June 2006; | • 6 June 2007 |

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Stakeholder Consultation

The TLC is also copied in on external regulatory correspondence to ensure that they are informed of Matilda's activities.

Matilda first presented its proposal to construct an ALA at Andranangoo to the TLC at a meeting on 21 June 2006. The TLC then provided Matilda with a letter of support for the project in July 2006, signed by John Hicks as Secretary/CEO (Appendix I).

In May 2007 the NT EPA asked Matilda to complete a PER for consideration of the project under the *Environmental Assessment Act*. Matilda has continued community consultation with the TLC and other stakeholders as a part of the PER process as detailed below.

14.3 Consultation During Preparation of PER

During preparation of this PER, stakeholder consultation included a range of groups. Initially, stakeholders were identified from using the list included in the 2006 EIS for the mining project (URS 2006a), and through consultation with the TLC.

The aims of this consultative process were to:

- Disseminate information and identify stakeholder issues;
- Obtain feedback from stakeholders;
- Respond to stakeholder issues; and
- Identify any additional stakeholders for further consultation.

14.3.1 Written communication

The following stakeholders were sent a letter outlining the proposed ALA project and offering a briefing. Most declined the offer of a briefing, as the background paper was sufficient and no further issues were raised. Several commented that they appreciated being kept informed;

- Minister for Mines and Energy, Chris Natt;
- Minister for Business, Economic and Regional Development, Kon Vatskalis;
- Local member for the Tiwi Islands, Minister for Family and Community Services, Marion Scrymgour;
- Deputy Commissioner Wernham, NT Police, Fire and Emergency Services;
- ECNT;
- NT Minerals Council;
- NT Industry Capability Network (NTICN);
- Amateur Fishermen's Association of the NT (AFANT);
- Executive Director, Regional Development, Department of Business, Economic and Regional Development, David Malone;
- Deputy Chief Executive, Department of the Chief Minister, Dennis Bree;
- AAPA Senior Anthropologist, Jeff Stead;
- Great Southern Plantations;
- NT Police, Fire and Emergency; and
- Chamber of Commerce NT.

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The ECNT was unavailable due to being in regional areas on both occasions that Matilda staff were in Darwin. Coordinator Charles Roche has advised that he would like a briefing, and this will be arranged in the near future.

Minister Scrymgour, the local member for the Tiwi Islands, was unavailable for a meeting.

14.3.2 Briefings

A number of groups did receive briefings on the ALA project from Matilda, comprising a formal presentation followed by questions. A detailed briefing note was provided, handouts were left with participants and maps were used to show the location of the proposed ALA. Detailed minutes were kept and a database of all stakeholders was maintained.

All meetings were attended by Matilda's Environmental Manager (Tina Girard), and all but the 13 August 2007 meeting were attended by a Communications Consultant from Michels Warren Munday (Jane Munday). The groups that received briefings for the project are as follows:

- A government assessments working group, convened by the EPA and including staff from the EPA, DPIFM, DHCS, Department of Planning and Infrastructure (DPI) and NRETA on 17 August 2007;
- Tiwi Islands Natural Resource Management group on 13 August 2007;
- Great Southern Plantations on 13 August 2007;
- TILG on 12 September 2007;
- Community meeting held at Milikapiti on 12 September 2007, attended by women and men of the community;
- TLC meeting on 11 September 2007 at the Andranangoo mine site, which was also attended by members of the EPA (Annie Andrews and Michael Browne), Executive Director of Minerals and Energy in DPIFM (Richard Sellers), Compliance Officer from DPIFM (Christine Fawcett), Matilda's Managing Director (Bruce Maluish) and Matilda's Site Manager (Dennis McCamish). This meeting was organised by the TLC and hosted by Matilda. EPA representatives were invited for a site visit after the meeting;
- The Minister for Natural Resources, Environment and Heritage (Delia Lawrie), in a briefing attended by Matilda's Managing Director (Bruce Maluish), Chairman of the TLC (Robert Tipungwuti), and TLC Environmental Manager (Kate Hadden) on 13 September 2007.

Verbal consultation was provided to the Melville Island Fishing Lodge (Mike Baxter, Managing Director) by Matilda's Environmental Manager (Tina Girard) on 13 August 2007.

In addition to the above, Michels Warren Munday conducted telephone research with a number of NT-based companies to explore alternative transport options to fixed wing aircraft (as discussed in Section 3, see records in Appendix C).

During planning for the project, aerodrome consultant Mr Peter Rohrlach, from Aerodrome Services NT Pty Ltd, consulted with CASA and government agencies about the design of the ALA.

14.4 Feedback from Stakeholders

14.4.1 Tiwi Islands

In briefings on the Tiwi Islands the TLC, Yimpinari Traditional Owners, and TILG all expressed support for the project and its potential to contribute to the island's infrastructure needs, jobs, training, and economic development. The only concern raised was the potential for transporting alcohol or drugs to the island via the ALA; Matilda confirmed that a random drug and alcohol testing program is implemented at the Andranangoo site, and that police also conduct random checks of planes and cargo.

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Great Southern Plantations suggested that the ALA could be useful for fire fighting operations, and for emergency response for plantation workers.

The Melville Islands Fishing Lodge was supportive of the project for its potential to improve access to the area and provide for emergency evacuations. Benefits that may be shared by the fishing charter business. The primary concern raised was the protection of Goose Creek. Matilda advised that the ALA project is not expected to impact Goose Creek, as the ALA is distant from watercourses, will be managed to limit erosion, and will not involve significant fuel storage.

14.4.2 NT Government

Several issues were raised by the EPA during a presentation by Matilda at the government assessments working group meeting:

- Advice from Minister Scrymgour that there was 'community dissent' over the project;
- The level of land clearing and permanent ecological impacts through disturbance of the site;
- EPA requested a robust analysis of alternatives; and
- EPA expressed concern as to whether the TLC's letter of support represented the genuine wishes of the Tiwi Islands land-owning groups.

Matilda has considered and attempted to address all of these concerns in this PER.

14.5 Proponent's Response to Stakeholder Concerns

A summary of the issues raised during stakeholder consultation, and Matilda's response to these issues, is provided in Table 14.1. The table also indicates where in the PER additional information on the issues can be found.

14.5.1 Consultation with Government agencies

To respond to concerns raised by the EPA during the PER with regards to community consultation, Matilda and the TLC invited members of the EPA to visit the Andranangoo mine site and attend the TLC meeting on 11 September 2007, to facilitate further discussion on the ALA project; EPA accepted this invitation.

14.5.2 Consultation on the Tiwi Islands

Matilda has completed extensive community consultation to date and utilised the TLC as the primary avenue for discussion with Traditional Owners and the local community, as per the Tiwi decision making process described below.

In addition, Matilda held a community meeting in Milikapiti to ensure women, additional members of the Yimpinari and other community members were briefed on the project. Matilda also attended a management meeting with the TILG and provided a project briefing.

Tiwi decision-making

It should be noted that the Tiwi people have a comprehensive means of coming to decisions on land use projects. Usually, the proponent briefs the community or community leaders. The matter is then discussed further within land-owning groups and further information may be sought. It may take several meetings to clarify any issues of concern.

Elected representatives of the land-owning groups attend the TLC meetings and will debate the issues, often robustly, until either unanimity is reached or the issue is deferred for more discussion. The decisions of the TLC are recorded in official minutes and any letter from the TLC's President reflects a consensus that has been reached by all land-owning groups.

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This is of particular note, as initial consultation feedback from the EPA indicated doubt that a letter signed by the TLC President Robert Tipungwuti represented the views of the Tiwi people. The subsequent involvement of EPA staff in a formal TLC meeting on the Tiwi Islands was constructive in providing understanding of Tiwi decision-making to the NT Government, as well as in providing support to Matilda's ALA project.

Tiwi Land Council

The TLC meeting hosted by Matilda at the mine site (Andranangoo) on 11 September 2007 was attended by two members of the EPA (Michael Browne and Annie Andrews) and two members of DPIFM (Richard Sellers and Christine Fawcett), who observed the complex, but democratic, decision-making processes of the Tiwi people and gained a greater understanding of their system. It was noted that while the project is located on Aboriginal land, the NT Government is accountable for a wider range of public concerns than those solely raised by the Traditional Owners on the Tiwi Islands.

However, the TLC was able to demonstrate the strong and unequivocal support for Matilda's ALA project among the 50 TLC representatives present at the meeting, and the enthusiasm of the Tiwi people for projects that deliver economic independence, jobs, training and infrastructure to their area.

The TLC raised concerns about the length of time taken in government approvals for the ALA project, and rejected suggestions of community dissent over the project.

The meeting was told that Matilda had just paid its first royalties of \$180,000 to the Tiwi people, and that the Yimpinari people would spend this money on a cement truck in order to service new house-building in Nguui.

Following the meeting DPIFM, EPA, GSP and members of the TLC had the opportunity to tour the mine site and inspect the proposed ALA site.

Yimpinari

Matilda conducted a formal briefing of the Yimpinari land-owning group on 12 September 2007, in Milikapiti. The meeting was attended by 15 people, seven of them women. Senior Traditional Owner Matthew Wonaeamirri said his people had been consulted previously and all were enthusiastic about the ALA project.

The main questions raised in this meeting related to the possibility of buying the Andranangoo camp after Matilda had finished mining and using it as an investment, for example as a fishing lodge. The ALA was seen as adding value to the site, similar to the M\$1 worth of roads Matilda has built in the area.

There was also discussion about the revival of the Milikapiti nursery, which will be used to grow seedlings for the rehabilitation of the Andranangoo mining area.

After the project description presentation, attendees discussed the project among themselves and voiced support to Matilda.

Tiwi Islands Local Government

A meeting was held with the TILG at Nguui on 12 September 2007. The meeting included male and female local government representatives from each of the Tiwi Island communities, including Milikapiti President Lynette de Santis, and TILG executive staff. No concerns were raised and representatives said they appreciated being kept informed.

The main discussion revolved around support for the Milikapiti nursery, to contribute to finding jobs for Tiwi people after the CDEP program ends, and TILG road-building contracts.

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Stakeholder Consultation

Table 14-1 Summary of the issues raised during stakeholder consultation for the ALA project

Topic	Issues raised	Proponent's response	Reference
Mine and Mine Planning			
Lifespan	What is the lifespan of the Andranangoo project?	The mineral sands project has a relatively short lifespan of about 2.5 years.	Section 2.6
Other activities	What happens after Andranangoo is finished?	Matilda's next proposed project is at Lethbridge Bay West. Matilda is also exploring several other sites, including Robinson Inlet and Puwanapi on the west of Bathurst Island.	See mining project EIS (URS 2006a)
Mining	What is the mining process?	The mining method is generally low impact. The sands are mined only to the top of the water table, a depth of around 2.5 metres. Heavy metals are removed through a gravity separation process, and the sand is returned and rehabilitated. No chemicals are used in the processing, and the plant is mobile so it can be moved as new areas are mined.	See mining project EIS (URS 2006a)
Lethbridge Bay West	Once Matilda is operating at Lethbridge Bay West, will another ALA be required?	Lethbridge at the moment is likely to operate for only 1 year, which would not justify an ALA. Also, there is no suitable area within 30 or 40 km. Matilda is still exploring this area however, and further discoveries could change this decision.	See mining project EIS (URS 2006s)
Bathurst Island	How long before Matilda moves to Bathurst Island? At the moment all the forestry and mining is on Melville Island and Bathurst Island people are missing out on the benefits.	Matilda has been exploring on Bathurst Island, including at Puwanapi, but early results from some of the western sides of the island have been disappointing. A timeframe for beginning operations at Bathurst has not been developed, and it is likely that operations at Andranangoo and Lethbridge Bay West will extend to at least 2012.	See mining project EIS (URS 2006a)
ALA			
Clearing for the ALA	The amount of land to be cleared seems large in comparison with the mine site and will constitute a large and permanent disturbance.	About 9 ha will be cleared, with vegetation lowered on another 8.6 ha. The mine site is around 45 ha in total, and this is considered relatively small for a mining operation. Clearing for the ALA is the minimum required for landing small aircraft, as required by CASA. The vegetation to be cleared is eucalyptus woodland, which is common on the island and is not considered sensitive or high in conservation value. Matilda will	Section 2.3

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Topic	Issues raised	Proponent's response	Reference
		rehabilitate the area by deep ripping and seeding if the Tiwi people do not wish to take over the responsibility of operation and maintenance of the ALA.	
Construction	Will the ALA be sealed bitumen or unsealed gravel?	The ALA will be constructed of compacted gravel. An unsealed ALA is likely to be easy to maintain with the TILG's existing road maintenance equipment, and can also be more easily rehabilitated if desired in future.	Section 2.3
Costs	Is the ALA being constructed at Matilda's expense?	The cost of construction, maintenance (during mining operations) and rehabilitation (if required at the end of mining) will be borne by Matilda. These costs are considered to be lower than the costs of current transport to other ALA's, and the losses incurred when transport is suspended during wet season road closures.	Sections 2.3, 2.4, 2.5, 2.6
Rationale	Why is the ALA needed?	Current ALA's are a long way from Andranangoo. A one-way trip to Pickertaramoor takes 1 to 3 hours, and to Milikapiti takes 2 to 4 hours (these are the ALA's most commonly used at present). The new ALA is needed: - to provide greater certainty for medical evacuations, - to reduce the need to transport staff and supplies over the dirt road from Pickertaramoor, Garden Point or Milikapiti, - to overcome the problem of road closures in the wet season and - to reduce the risk of transporting weeds from Pickertaramoor.	Sections 1.4, 9.1
Rationale	Why wasn't the ALA included in the original EIS application?	As with all new businesses, Matilda identified new risks during the first year of operations that must be managed. Matilda under-estimated the effects of the climatic extremes causing road closures and was under the impression there was a 24-hour medivac service in Darwin, which subsequently proved not to be the case.	Sections 9.2, 3.3
Traffic	If light vehicles can't travel on the roads during the wet season, what happens to haul trucks?	Matilda does not operate haul trucks during the wet season, but stockpiles ore and transports only in the dry season.	Section 9.1
Traffic	What are the effects of reducing the amount of light traffic on the roads, due	Although light vehicles (4WD's) do not contribute to road damage as much as heavy vehicles (haul trucks), they do still cause some soil erosion and can contribute to weed	Section 9.1, 9.2

Section 14

Stakeholder Consultation

Topic	Issues raised	Proponent's response	Reference
	to operation of the ALA?	spread. Reducing the number of light vehicles on the road reduces Matilda's risk of a worker accident due to driver fatigue or hazardous driving conditions.	
Maintenance	What is the ability of the Tiwi people to maintain the ALA if it is handed over to them?	The TLC already maintains seven existing ALA's on the Tiwi Islands. The Andranangoo ALA will be low maintenance and if the camp is retained by the Tiwi people for business use (such as a fishing lodge), it could be leased to the operator to maintain.	Section 9.1, 14
Alternatives	What alternatives were considered to the ALA? The PER should include a thorough discussion of alternatives for transport to the mine site, including barges, helicopters and sea planes.	Helicopters remain a useful form of transport but the cost of having a helicopter on stand-by 24 hours a day is prohibitive, and availability of helicopter charters is lower than that of light aircraft. A barge landing was not considered feasible due to the significant impact on sensitive turtle nesting beaches. Sea planes are not considered feasible due to large tidal variations in Goose Creek, the potential for floating debris following heavy rain and the increased risk of crocodile attack.	Section 3
Rehabilitation	How will the ALA be rehabilitated?	If, as indicated, the Tiwi people want to obtain responsibility for the ALA, it would be left in good condition for them to maintain. Otherwise it would be deep ripped and seeded, similar to rehabilitation activities on the adjacent mine site.	Section 2.6, 3.1.1
Management	What capacity do the Tiwi people have to maintain ALA's?	The TLC already maintains seven airstrips, and have indicated that their financial capacity is sufficient to include maintenance of this new ALA. The existing road maintenance equipment, run by the TILG, would be sufficient to maintain erosion of the ALA surface.	Section 9.1, 14
Existing Environment			
Baseline studies	What environmental studies have been done?	Comprehensive flora and fauna studies were conducted for the original EIS in 2005, as well as ALA-specific baseline ecological and archaeological studies in 2006 and 2007.	Section 5, 6, 7
Baseline studies	Fauna	A fauna survey was conducted in September 2006 and 3 listed species were found (1 small mammal, 2 birds). A masked owl (endangered) was also recorded incidentally close to the site however no roosting or nesting sites were found.	Section 6
Baseline studies	Flora	Flora surveys were conducted in November 2006 and June 2007. The vegetation community at the ALA (eucalypt woodland) is considered common throughout the Tiwi	Section 5

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Stakeholder Consultation

Topic	Issues raised	Proponent's response	Reference
		Islands, and of low conservation value. Cycads (<i>cycas armstrongii</i>) were the only listed species recorded, and Matilda has an NRETA permit to take and sell these; it is intended to relocate cycads, offering them to the local Tiwi community for sale to the Milikapiti nursery (if operating), or to collectors and nurseries on the mainland with any income provided to the TLC.	
Baseline studies	Consideration should be given to breeding seasons of local species and the time of year of surveys.	Flora surveys were conducted in both wet and dry season conditions to capture data on a wider range of species. Fauna species were conducted during the late dry season, and due to the common nature of the habitat type and the relatively small area of disturbance, follow-up surveys were not considered necessary to gain further insight into species diversity.	Section 5, 6
Baseline studies	Consideration should be given to insect-attracting flora in the area	The flora survey indicated that the ALA site consists of eucalypt woodland that is common throughout the Tiwi Is. The ALA site is surrounded by vast areas of undisturbed vegetation that provide sufficient habitat for any insects local to Andranangoo.	Section 5
Hydrology	What impact will the ALA have on watercourses?	The ALA is in an elevated area on lateritic soils and no drainage features traverse the site. It is not anticipated that the ALA will impact on local watercourses, such as the Andranangoo swamp and Andranangoo spring.	Section 4
Commonwealth referral	Has the project been referred to the Commonwealth under the EPBC Act to see if it is determined as a controlled action?	Matilda submitted an EPBC Referral to the DEW in October 2007.	Section 1.6.2
Archaeological	What archaeological surveys have been conducted?	An archaeological survey of the ALA was conducted in 2006, and no Aboriginal artefacts or historical artefacts were recorded. Part of the ALA is covered by Matilda's existing AAPA sacred sites clearance certificate, and the un-certified portion is the subject of a current application for clearance.	Section 7
Pests and weeds	What are the issues with pests and	The spread of cane toads is considered a risk as the Tiwi Islands are free of cane toads at present; cane toad traps will be installed along the edges of the ALA. Matilda also	Section 5, 6

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Stakeholder Consultation

Topic	Issues raised	Proponent's response	Reference
	weeds?	has an existing weed monitoring and control program, and weed spread is recognised as a significant environmental risk at Andranangoo. Reducing driving to and from Pickertaramoor will reduce the risk of weed spread from a known infested area to the mine area.	
Greenhouse gas emission	If reduced vehicle traffic on the roads will reduce greenhouse gas emissions, this should be included in the PER	Greenhouse gas emissions for flying direct to Andranangoo are slightly lower than flying to Pickertaramoor and driving to Andranangoo. Calculations are included in this PER.	Section 11
Hazardous goods	What hazardous goods will be stored on site, including hydrocarbons?	No fuel storage is proposed at the ALA, as aircraft would refuel for the return trip from Darwin Airport. Small volumes (two or three 205 litre drums) of aviation fuel may be stored in the existing bunded fuel storage facility at the Andranangoo mine site, for use in emergencies or special circumstances.	Section 10
Jobs and training			
Jobs	What jobs are available to the Tiwi people?	Because the ALA project is short-term, the main benefits to the Tiwi people are mine royalties and the provision of long-term infrastructure. The ALA project itself is unlikely to provide employment opportunities as it is short term, however the Andranangoo mine site currently employs Tiwi staff for environmental and road maintenance projects, and there are plans to expand employment opportunities where possible. Matilda also plan to sponsor a part-time Tiwi manager of the Milikapiti nursery.	Section 13
CDEP	The PER should discuss the impact of CDEP ending, this could impact on provision of TILG road crew services.	Due to cessation of CDEP funds, both the TLC and TILG expressed hope that projects such as Matilda's mine operation would provide permanent jobs for Tiwi people. Under the proposed local government reforms, road maintenance will be the responsibility of the new shires. Matilda will continue to provide employment opportunities to the local people where possible.	Section 13, 14
Community consultation			
Consultation concerns	The previous Minister for the Environment indicated to the EPA that	Matilda has been consulting with the TLC and Yimpinari Traditional Owners since it first applied for exploration leases. An extensive consultation process with all parties on the	Section 14

Section 14

Stakeholder Consultation

Topic	Issues raised	Proponent's response	Reference
	there was strong opposition to the project among the Tiwi people. The written support from the TLC contained only a short statement from the TLC President indicating support. More evidence of community support is needed for the PER, particularly outside the TLC.	Tiwi Islands preceded the EIS for the mining operation, with nothing but support for Matilda's plans. The TLC advises that between October 2005 and August 2007, there were 18 minuted meetings with the TLC and landowning groups where Matilda exploration and mining leases and the Milikapiti nursery were discussed, with nothing but unanimous support expressed. The TLC and Yimpinari people have been further consulted since 2006 on the ALA proposal and again indicated their full support. Two members of the EPA attended a TLC meeting at Andranangoo on 11th September 2007, and observed the decision-making processes of the TLC to provide an increased understanding of how the Tiwi people come to a consensus on issues. The meeting of some 50 land owning representatives expressed unanimous support for the ALA project and frustration at the time it was taking to get it approved. Matilda conducted further consultation with the Yimpinari people and TILG, where no concerns were raised, and support was expressed. All groups said the ALA project would provide valuable infrastructure and jobs for the Tiwi people.	

Section 14**Stakeholder Consultation****14.6 Consultation During the PER Review Period**

Under NT legislation, the PER is available for public review for a fixed period. During this time, the proposal is available for further scrutiny by all stakeholders. The PER will be available for viewing public libraries and various government offices, as directed in the PER Guidelines (Appendix A). A public notice will be placed in the *Northern Territory News* and *Tiwi Times* advising of this public review process, and Matilda will provide information to stakeholders when requested.

Matilda will continue the community consultation process while the PER is on public display.

14.7 Ongoing Consultation

Matilda has a strong commitment to on-going community consultation on all its Tiwi Islands projects, and will continue to communicate openly and frequently with the TLC and relevant land-owning groups. In particular, recent discussions about employment and support of the Milikapiti nursery will continue and Matilda will continue to attend TLC meetings and community events whenever possible.

14.8 Commitments

Matilda commits to continuing stakeholder consultation throughout the PER public review period for the ALA project.

Matilda commits to maintaining open and regular communication with the TLC and relevant land-owning groups throughout the construction, operation and rehabilitation phase of the ALA and the Andranangoo mining project.

Section 15

Risk Assessment

15.1 Impact Evaluation Methodology

To identify environmental risks that require specific management actions, a qualitative evaluation of potential impacts likely to be associated with the proposed ALA has been carried out, based on Australian Standard AS/NZS 4360:2004 Risk Management and the information contained in this PER.

AS/NZS 4360:2004 assesses environmental risks based on both the likelihood and the consequence of a particular impact occurring and compares the results to a risk assessment matrix, providing a qualitative rating of the significance of the risk.

The criteria for ranking the consequences of potential impact events are presented in Table 15.1, in a five-point scale. These criteria relate to the following broad areas:

- Safety;
- Cultural and heritage;
- Socio-economics;
- Business; and
- Environment.

Likelihood of impact events was also measured on a five-point scale, according to the criteria presented in Table 15.2.

Assessments were based on literature review, analysis of baseline survey data, review of design layouts and the PER Guidelines, operational information provided by Matilda and past experience.

In order to assess the significance of impacts the team, the following questions were posed:

- What impacts can occur?
- What is the likelihood of these events?
- What are the consequences of the event?

What are the overall risks (likelihood x consequence)?

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Risk Assessment

Table 15-1 Criteria for ranking consequence of impact events

Level	Descriptor	Safety	Cultural and Heritage	Socio-Economics	Business	Environment
1	Insignificant	Minor injury	None to minimal impact on Indigenous or non-Indigenous heritage sites or values.	None to minimal reported complaints about Project. No socio-economic impacts.	<\$10,000	Minor non-conformance – no impact, minor breach in procedure.
2	Minor	Medical attention required	Minor impact on Indigenous or non-Indigenous heritage sites or values (e.g. restricted access to recreation areas).	Some inconvenience to stakeholders, minimal adverse impact on socio-economic environment, and some intervention required.	\$10,000 to \$100,000	Minor impact – minimal impact outside the local area.
3	Moderate	Disability/ Lost Time Incident (LTI)	Moderate impact on Indigenous or non-Indigenous heritage sites, which can be managed under normal procedures. Some negative media coverage could be expected.	Moderate disruption or inconvenience to stakeholders. Require careful management to restore trust.	\$100,000 to \$500,000	Moderate impact – external to local area, generally contained on site.
4	Major	Permanent Disability / Fatality	Major disturbances to significant Indigenous or non-Indigenous heritage sites or values. Major breach of statutory obligation, access to resource denied in the medium to long-term.	Significant adverse impacts to sectors of the community and stakeholders. Long-term social disruption, diminished quality of life of large or specific sectors of the community.	\$500,000 to \$1M	Major impact – harm or breach of license conditions or obligations, discharges off site.
5	Catastrophe	Multiple Fatalities	Major disturbances to a number of significant Indigenous or non-Indigenous heritage sites or values. Major breach of statutory obligation, access to resource permanently denied.	Irreversible damage to the socio-economic environment. Potential for civil commotion or riot and major damage to Matilda property.	>\$1M	Catastrophe – long term, significant legal implications and potential to affect community.

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Risk Assessment

Table 15-2 Criteria for ranking likelihood of impact events

Level	Measure	Description	Timeframe
A	Will Occur	Issue will occur, is currently a problem or is expected to occur in most circumstances.	Weekly
B	Likely to occur	Issue has been a common problem in the past and there is a high probability it will occur in most circumstances.	Once per month
C	Should Occur	Issue may have arisen in the past and there is a high probability that it should occur at some time.	Once in 6 months
D	Could Occur	Issue may have occurred in the past and there is a moderate probability that it could occur at some time.	Once per 10 years
E	Rare	Issue has not occurred in the past and there is a low probability that it may occur in exceptional circumstances.	Once per life of facility

The combination of the likelihood and consequence ratings was then compared to the qualitative risk analysis matrix, providing an indication of the magnitude or significance of the impact (ranging from low high to priority). The adopted risk assessment matrix is presented in Table 15.3.

Table 15-3 Risk assessment matrix

LIKELIHOOD	CONSEQUENCE				
	1 – Insignificant	2 – Minor	3 – Moderate	4 – Major	5 – Catastrophe
A – Will Occur	S	S	H	H	H
B – Likely to Occur	M	S	S	H	H
C – Should Occur	L	M	S	H	H
D – Could Occur	L	L	M	S	H
E – Rare	L	L	M	S	S

Risk Definitions (AS/NZS 4360:1999)

H = High	Detailed research and management planning required at senior levels. Immediate action required
S = Significant	Senior management attention needed.
M = Moderate	Management responsibility and integration into management plans required.
L = Low	Manage by routine procedures.

15.2 Impacts, Issues and Management

A summary of the environmental risks associated with the construction and operation of the Andranangoo ALA is presented in Table 15.4. Also included are the management controls proposed by Matilda to prevent risks, or mitigate risks to acceptable levels.

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Risk Assessment

Table 15-4 Risk assessment for the Andranangoo ALA project; construction, operation and maintenance

Aspects	Potential Impacts	Consequence Ranking	Likelihood Ranking	Risk Ranking	Management
Risks to the Environment					
Landform and soils	Land disturbance from clearing for ALA	2	A	Significant	Aircraft Landing Area Construction EMP – Section 17.1
Landform and soils	Erosion of the ALA	2	C	Moderate	Surface Water and Erosion EMP – Section 17.2
Surface Water	Sedimentation of local waterways	3	E	Moderate	Surface Water and Erosion EMP – Section 17.2
Surface Water	Contamination of local waterways	3	E	Moderate	Surface Water and Erosion EMP – Section 17.2
Groundwater	Contamination of groundwater	3	E	Moderate	Groundwater Quality EMP – Section 17.3
Flora	Loss of floristic diversity	3	D	Moderate	Flora EMP – Section 17.7
Flora	Loss of threatened or endangered species	4	E	Significant	Flora EMP – Section 17.7
Flora	Introduction of weed species	4	B	High	Pests Weeds and Diseases EMP – Section 17.9
Fauna	Loss of fauna diversity and habitat	3	D	Moderate	Fauna EMP – Section 17.8
Fauna	Loss of threatened and/or endangered species	4	E	Significant	Fauna EMP – Section 17.8
Fauna	Introduction of pest animals	4	D	Significant	Pests Weeds and Diseases EMP – Section 17.9
Archaeology and Heritage	Potential for unknown archaeological sites to be disturbed	2	E	Low	Archaeological Chance-Find Procedure

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Risk Assessment

Aspects	Potential Impacts	Consequence Ranking	Likelihood Ranking	Risk Ranking	Management
Archaeology and Heritage	Potential for sacred sites to be disturbed	3	E	Moderate	Communicate potential for protected grave sites to personnel, as per conditions of AAPA clearance certificate
Air Quality and Noise	Increased dust emissions	2	B	Significant	Dust and Noise EMP – Section 17.6
Air Quality and Noise	Increased noise emissions	2	B	Significant	Dust and Noise EMP – Section 17.6
Waste Management	Increased littering around the ALA	2	C	Moderate	Waste Management and Disposal EMP – Section 17.4
Waste Management	Smothering of vegetation with clearing debris and topsoil	3	D	Moderate	Aircraft Landing Area Construction EMP – Section 17.1
Hazardous Substances	Contamination via regular small spills or leaks	2	C	Moderate	Hydrocarbon and Hazardous Substances EMP – Section 17.5
Hazardous Substances	Contamination via major spill, e.g. failure of storage vessel	4	E	Significant	Hydrocarbon and Hazardous Substances EMP – Section 17.5
Biting Insects	Creation of new breeding sites	2	D	Low	Biting Insects EMP – Section 17.11
Biting Insects	Pest or disease impacts on personnel	2	B	Significant	Biting Insects EMP – Section 17.11
Risks to ALA Operations					
Stormy Weather, Cyclones	Dangerous flying and landing conditions, shutdown of ALA	3	C	Significant	Emergency Response Procedures
Bushfire	Lack of visibility, shutdown of ALA	3	C	Significant	Pilot's responsibility to check, via communication with Matilda mine site personnel

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Risk Assessment

Aspects	Potential Impacts	Consequence Ranking	Likelihood Ranking	Risk Ranking	Management
Flooding	Dangerous landing or takeoff conditions, shutdown of ALA	3	D	Moderate	Pilot's responsibility to check, via communication with Matilda mine site personnel
Aircraft Accident	Potential disabling of emergency evacuation capability if ALA is unusable, long distance and time to medical attention	4-5	D-E	Significant-High	Emergency Response Procedures

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Risk Assessment

Matilda will continue to systematically evaluate the HSEC risks associated with the proposed ALA through the construction, operation and maintenance phases of the project. These will be documented in the site HSEC Aspects and Impacts Register. Methods for gathering information for inclusion in the register will include but not be limited to:

- site visits;
- operational observations;
- interviews with key personnel; and
- literature reviews.

15.3 Commitments

Matilda will continue to systematically evaluate the HSEC risks associated with the proposed ALA through the construction, operation and maintenance phases of the project. These will be documented in the site HSEC Aspects and Impacts Register.

Matilda will implement management actions for the ALA as detailed in Table 15.4, including EMP's and other procedures.

Section 16

HSEC Management System

16.1 HSEC Management System Framework

Matilda has developed a HSEC MS to assist identification and management of HSEC responsibilities at the Andranangoo mine site, and to allow for continuous improvement of HSEC performance. The HSEC MS is based on the Australian Standard AS/NZS 14001:2004 for Environmental Management Systems and AS/NZS 4801 Standards for Health and Safety Management.

As discussed in Section 15, Matilda has assessed the potential HSEC impacts of the construction and operation of the ALA. As the ALA represents a new activity for the mine site, the existing HSEC MS has been reviewed in order to incorporate extra legal obligations, HSEC objectives and targets, monitoring and reporting that relate to construction and operation of the ALA.

Relevant components of the existing Matilda HSEC MS are briefly described below.

16.2 HSEC Environmental Policies

Matilda has developed and implemented policies to demonstrate the company's commitment to achieving the highest standard of health, safety, environmental and community relations management. These policies are attached at Appendix J.

16.3 Planning

16.3.1 Identification of HSEC Aspects and Impacts

Matilda has developed procedures for its Tiwi Islands operations that allow for the identification of aspects of their operations that could potentially impact on the health and safety of personnel and contractors, the environment, and the Tiwi Island community. These impacts have been risk assessed according to the methodology presented in Section 15, and management plans and operational procedures have been developed for mitigation of the significant and high-risk potential impacts.

Matilda has developed an HSEC Aspects and Impacts Register, which is reviewed annually, or whenever operations change significantly such as for the construction and operation of the ALA. Methods for gathering information for inclusion in the register include the following:

- site visits;
- operational observations;
- interviews with key personnel; and
- literature reviews.

16.3.2 Legal and Other Requirements Register

It is Matilda's policy to comply with the Commonwealth and NT legislation and policies, industry guidelines and standards that are relevant to its operations.

A list of Commonwealth and NT legislation and policies that are or could be relevant to Matilda's activities is presented in Section 1.7.

A detailed register identifying Matilda's HSEC legislative obligations and other commitments, and how these legal and other obligations relate specifically to operational requirements, has been developed and made available on site for staff and contractors to view. Licences, lease agreements, company policies and procedures are also included in this register.

Practical steps to implement these obligations have been incorporated into operational procedures.

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HSEC Management System

16.3.3 HSEC Objectives and Targets

Objectives and targets have been developed for each of the significant or high-risk HSEC impacts associated with Matilda's operations. These are contained in the EMP's presented in Section 17.

The objectives and targets are designed to be measurable, practical and consistent with Matilda's HSEC policies. They also take into account legal and other obligations. It is noted that obligations, HSEC risks, and objectives and targets may change over the life of the operations.

16.3.4 HSEC Management Plans

Matilda has developed management plans to allow implementation of the HSEC MS at an operational level. Management plans relate to HSEC aspects that could be affected by the mining operation, and document objectives, management actions, monitoring, reporting and legal obligations.

Management plans have been revised in response to the potential HSEC impacts of the ALA project, and are presented in Section 17. They relate to the following aspects:

- Aircraft Landing Area;
- Groundwater Quality Protection;
- Surface Water Quality Protection;
- Hydrocarbon and Hazardous Substances Management;
- Waste Management and Disposal;
- Emissions: Air quality, Dust and Noise;
- Fire Management;
- Flora;
- Fauna;
- Sea Turtles;
- Pest, Weeds and Diseases; and
- Biting Insects.

Supporting procedures have been developed to aid in implementing the management plans, and these procedures will be further revised where necessary to include the management of the ALA.

16.4 Implementation

16.4.1 Roles and responsibilities

Matilda's HSEC Responsibilities Chart is attached at Appendix J. This chart details the roles of all Matilda personnel in the implementation of the HSEC Management System.

Development, review and administration of the HSEC MS is undertaken by the HSEC Manager and HSEC Coordinator (located in Matilda's Perth head office), and an HSEC Officer at the mine site.

16.4.2 Training and competency

Matilda has developed an HSEC Induction Procedure, including a Site Induction package which includes health and safety information. The induction is delivered by the Site HSEC Officer or Site Manager to all personnel, contractors and unaccompanied visitors upon arrival at site.

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HSEC Management System

Inductees are then required to complete an HSEC Induction Questionnaire to demonstrate understanding of the induction presentation. Inductees must achieve a minimum score of 85% to be deemed to have passed and if this score is not achieved, the HSEC Officer or Site Manager is required to review the presentation with the Inductee to ensure competency. A register of personnel who have completed the induction is retained onsite.

Matilda will continue to develop and implement a suite of HSEC training packages to be delivered to staff and contractors. The packages will include modules such as:

- Emergency response;
- Local flora and fauna awareness;
- Spill prevention and recording;
- General workplace environmental management;
- Driving safety; and
- General workplace health and safety.

This is complemented by ongoing training needs analysis to identify any additional internal and external training requirements.

16.4.3 Communication and awareness

Matilda has developed and implemented an Internal HSEC Communications Procedure (HSEC Procedure 6.2.1) to ensure that health, safety, environment and community information is communicated to personnel and contractors. The procedure is also designed to facilitate the provision of feedback, ideas and information from personnel and contractors to Matilda management.

In addition, Matilda has developed a Community Relations Policy (see Appendix J) and has implemented a Stakeholder Communication and Consultation Procedure (HSEC Procedure 6.3.1). The procedure outlines the process to be followed to communicate and consult with external parties including regulators, Traditional Owners, Matilda's shareholders, the general public and other interested parties.

As described in Section 14.2, a representative from Matilda periodically attends TLC meetings to inform the Traditional Owners and community on activities at the Andranangoo mine site. The TLC is also copied in on external regulatory correspondence to ensure that they are informed of Matilda's activities.

Internal auditing will be conducted to ensure that activities are compliant with the above procedures. Results from the audit process will be used to review and update the procedures if required.

Community consultation regarding the proposed ALA completed as part of the PER is detailed in Section 14.

16.4.4 Documentation

Matilda is in the process of developing a document control procedure which will be used to manage HSEC MS and other documents that contain environmental obligations, such as licences and permits.

Other documents developed by Matilda to support the HSEC MS include procedures, meeting minutes, housekeeping inspection checklists, and Incident/Hazard/Near Miss Reports.

16.4.5 Emergency preparedness and response

Matilda has developed procedures for maintaining preparedness and responding to both safety and environmental emergencies, and has an Emergency Response Plan (ERP) for the Andranangoo mine site.

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HSEC Management System

The ERP is designed to be an overarching document containing general emergency information including delegation of responsibilities, important contact numbers and general procedures to be followed when an emergency situation is identified. The ERP is to be used in conjunction with the following specific emergency response procedures:

- Cyclone Procedure (HSEC Procedure 8.2)
- Severe Storm Procedure (HSEC Procedure 8.3)
- Spill Response Procedure (HSEC Procedure 8.4)
- Medical Emergency Procedure (HSEC Procedure 8.6)

Auditing and testing of the emergency response procedures will be conducted to ensure the procedures are robust, achievable and effective.

In the event of a significant incident, DPIFM will be informed verbally as soon as practicable and in writing within 14 days, as per the *Mining Management Act 2001*.

It should be noted that the low number of emergency transport options accessible by workers at the mining operation, particularly within a short timeframe, is a major driver behind this proposal by Matilda to construct and operate an ALA on site.

Prior to construction and operation of the ALA, the ERP will be revised to incorporate the improved access to the mine site that the ALA offers, as well as the additional risks associated with accepting aircraft direct to the site, such as the risk of an aircraft accident.

Aircraft accident

A formal procedure will be developed to manage a potential aircraft accident at the Andranangoo ALA during take-off or landing. Control of the incident will be assumed by the Site Manager (or a delegate). First aid will be provided as outlined in the Medical Emergency Procedure (HSEC Procedure 8.6).

Fire fighting equipment is available at the Andranangoo mine site at all times, and can be quickly deployed to control any fires caused by aircraft accidents at the ALA.

16.5 Checking

16.5.1 HSEC monitoring

Management plans define specific HSEC monitoring requirements, to determine the effectiveness of management actions. Current monitoring programs at the Andranangoo mine site involve both regular measurements by site personnel and periodic scientific surveys by specialists.

HSEC monitoring results and performance against objectives and targets are documented in Matilda's MMP which is updated annually for submission to DPIFM.

16.5.2 Incident reporting

Matilda has developed and implemented an Incident, Hazard and Near-Miss Reporting Policy and an Incident, Hazard and Near-Miss Reporting Procedure (HSEC Procedure 7.1). The aim of this procedure is to ensure that all incidents, hazards and near misses are reported to the HSEC Manager who then investigates the event and coordinates the implementation of corrective or preventative action. The HSEC Manager is also responsible for reporting of significant incidents to DPIFM.

Matilda tracks incidents, hazards and near misses internally. There were no reportable incidents at the Andranangoo mine site during 2006-2007.

Section 16**HSEC Management System****16.5.3 Internal audits and reviews**

Matilda will be conducting the first audit of the HSEC MS in the first half of 2008. Results of this audit will be reported to the Managing Director and will be used to update the HSEC MS where necessary to improve HSEC performance.

16.6 HSEC MS Status

Matilda has directed considerable resources into the development and implementation of the HSEC MS since the beginning of mining operations in October 2006, and has completed procedures for a range of operational and monitoring activities. These procedures have been communicated to personnel during the induction process and through training and awareness sessions,

To date, implementation of the system is approximately 70% complete; Matilda is working towards achieving 100% completion before 30 December 2007. As described in Section 16.5.3, an audit of the HSEC MS will be conducted in the first half of 2008, to ensure the system is robust and workable.

The HSEC MS will be continually audited, and updated where necessary, to work towards continual improvement in Matilda's performance.

Section 17**Environmental Management Plans**

This section presents the Environmental Management Plans (EMP's) developed to manage environmental aspects that may potentially be impacted by Matilda's Andranangoo mining operations. These aspects were assessed as being of a "moderate" risk level or above, according to the risk assessment methodology referred to in Section 15.

These EMP's were first presented in Matilda's original EIS for the mineral sands mining project (URS 2006a), and were also included in the project's MMP, submitted to DPIFM in June 2006. The EMP's were revised and amended versions were submitted to DPIFM as part of the 2007 MMP in August 2007 (Matilda 2007). The EMP's have been further revised during the development of this PER, to incorporate the environmental risks of operating an ALA at the Andranangoo mine site, and now include extra management objectives, actions and monitoring to reduce environmental risks.

In addition to the existing EMP's for specific environmental issues, an Aircraft Landing Area Construction EMP is also presented, which would apply to the short term activities of land clearing and surface preparation required for the construction phase of the ALA proposal.

The EMP's contained in this Section are as follows:

- 1) Aircraft Landing Area Construction;
- 2) Surface Water and Erosion;
- 3) Groundwater Quality;
- 4) Waste Management and Disposal;
- 5) Hydrocarbon and Hazardous Substances;
- 6) Emissions (Air Quality, Dust and Noise);
- 7) Flora;
- 8) Fauna;
- 9) Pest, Weeds and Diseases;
- 10) Fire;
- 11) Biting Insects;
- 12) Sea Turtles Management; and
- 13) Radiation Management Plan.

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17.1 Aircraft Landing Area Construction Environmental Management Plan

Objectives and Targets	To prevent negative environmental impacts to undisturbed areas during ALA construction activities To install the ALA in accordance with the requirements of CAAP 92-1(1)
Actions	• Complete construction during dry season conditions. • Ensure clearing is kept to a minimum and limited to the dimensions required to comply with CAAP 92-1(1). A handheld GPS tracker will be used to identify clearing area boundaries. • Harvest specimens of <i>Cycas armstrongii</i> prior to clearing, and offer to the TLC for possible sale to collectors or nurseries in the NT. All proceeds of the sale of <i>Cycas armstrongii</i> will belong to the Tiwi Islands community. • Designate areas only for stockpiling of vegetation debris and soil during clearing. Avoid widespread dumping into undisturbed forest areas. • If ALA handover to the TLC is anticipated, burn cleared vegetation in stockpiles when dry. If rehabilitation of the ALA is anticipated at the time of construction, retain vegetation in stockpiles for respreading in the future during ALA rehabilitation. • Install drains and turn-outs at regular intervals along the edges of the Runway Strips to slow stormwater runoff. • Prohibit storage of fuel or oil at the ALA; all machinery refuelling and maintenance to be undertaken at the Andranangoo mine site. • Collect all waste from the ALA construction site and dispose of at the existing Andranangoo landfill area.
Monitoring	Site Supervisor is to conduct daily checks during the construction period to ensure compliance to all actions listed above
Reporting	Weekly summaries of daily site inspections will be forwarded to Matilda's Environmental Manager
Corrective Actions	Significant non-compliances with this EMP will be reported using Matilda's Incident/Hazard/Near Miss Reporting Procedure, and will be communicated to the Environmental Manager
Relevant Legislation and Standards	Matilda's Environmental Policy Civil Aviation Authority – Civil Aviation Advisory Publication Number 92-1(1) Guidelines for Aeroplane Landing Areas <i>Soil Conservation and Land Utilisation Act</i> <i>Waste Management and Pollution Control Act</i>

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17.2 Surface Water and Erosion Environmental Management Plan

Objectives and Targets	To ensure that potential negative impacts on surface water quality are prevented or minimised. To minimise erosion and disturbance to drainage. To prevent erosion or deposition of sediment into surface water bodies beyond natural fluctuations. To prevent disruption to fish movements in adjacent creeks.
Actions	Landform • All earthworks should be managed so as to minimise disturbance to drainage channels and erosion. • Maintain buffer zones from mining activities to the Spring High Water Mark of 200m on turtle nesting beaches, to prevent inundation of mining areas during tidal surges to the sites. • Minimise the area of disturbance in order to minimise the volume of surface water generated in the mining slot and the volume of sediment that can be eroded. • Construct internal drainage within the mining slot to collect run-off, prevent soil erosion and sediment transport outside the mining slot by tailings. • Backfill the mining slot and compact the area with earthmoving machinery as soon as practicable after mining ceases. • Backfill mined areas to provide a stable landform that is consistent with the pre-mining landform and compatible with surface water drainage requirements prior to revegetation. • Revegetate the backfilled landform as soon as practicable with an appropriate range of species. Sedimentation and Drainage Control • Maintain drains and turn-outs along the edges of the ALA Runway Strips to slow stormwater runoff and minimise erosion from the compacted runway surface. Clear sedimentation and vegetation regrowth from these drains annually. • Maintain buffer zones of 50m from mining activities adjoining adjacent creek systems, wetlands/damplands and the mangroves to prevent deposition of sediments into these systems. • Establish a 20m vegetated buffer zone with silt fencing and a small bund around the existing spring near the Andranangoo deposit to prevent soil deposition into the existing spring and stream and prevent potential flooding of the mining area from the spring or break-out from the mining slot into the stream. • Wait until flows in the Andranangoo spring drainage line have ceased for the dry season before mining the adjacent mineralised zone, and restore original landforms, water contours and soil stability to the area well before the following wet season. • Construct a temporary bund and shallow spoon drain on the escarpment side of the road in the mining area to provide flood protection to the active mining area and divert flows around the active mining and rehabilitation areas. • Spread surface water flows from spoon drains and diversions into the rehabilitation areas using wide and shallow drains with minimal slopes. • Install adequately sized spoon drains parallel to the haul roads and adequately sized floodway(s), pipes or culverts beneath the haul road at existing streams and otherwise at regular intervals to collect surface water from existing streams and from the haul road spoon drains. • Construct haul roads at the appropriate elevation and compaction and with the appropriate materials for the proposed traffic volume of trucks/day and weight to minimise the potential for washout of the haul roads during large storm events. • Construct small spoon drains to divert surface water flows around feeder stockpiles and maintain silt fences around the perimeter of the feeder stockpile to minimise the transport of sediment.

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	Contamination - No refuelling or maintenance of aircraft to be carried out at the ALA, except in exceptional or emergency situations, when spill response kits will be available in the event of any fuel spills. - Store any small volumes of aviation fuel, to be available for ALA emergency or special circumstances use, in the existing fuel storage area at the mine site. - Construct a facility with bunding and roofing for the HMC stockpile at the Andranangoo and Lethbridge sites. - Use the existing bunded and roofed facility at Port Melville to stockpile mineral sands from both Andranangoo and Lethbridge sites prior to shipping. - Prevent excavation into acid sulphate soils (ASS). This will prevent acidification and resulting metals mobilisation of surface water. - Store fuel in double skinned isotainers and chemicals in sealed and bunded facilities. Monitor water quality visually prior to discharge from these facilities. - Fuel spills will be treated using a spill response kit that will be stored at the site. - Transport chemical and oily wastes to Port Melville to be shipped to Darwin for disposal in an appropriate waste management facility.
Monitoring	Soil erosion monitoring around the minesite and ALA Surface water monitoring program. Rainfall monitoring. Flow measurement downstream of the spring at Andranangoo. Visual inspections of chemical, hydrocarbon and concentrate storage facilities.
Reporting	The results of Matilda's surface water quality management and monitoring program will be documented in Matilda's Annual Report of performance against the MMP. Where an incident causes or threatens to cause pollution resulting in material or serious environmental harm DPIFM be informed within 24 hours of becoming aware of the incident as per the requirements of the Mine Management Act 2001.
Corrective Actions	The following will be classified as an incident or failure to comply in relation to surface water management: - Increased top soil erosion - Sedimentation throughout local water courses - Surface water contamination All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures.
Relevant Legislation and Standards	Matilda's Environmental Policy <i>Mine Management Act 2001</i> <i>Soil Conservation and Land Utilisation Act</i> <i>ANZECC Guidelines for Fresh and Marine Water Quality 2000</i> <i>Waste Management and Pollution Control Act</i> (only applies off the Mining Lease – Mine Management Act applies on lease) <i>Water Act</i>

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17.3 Groundwater Quality Environmental Management Plan

Objectives and Targets	To ensure that potential negative impacts on groundwater quality are prevented or minimised. To prevent impact due to borefield operation.
Actions	- Complete a detailed groundwater model for Lethbridge Bay to provide information on the extent of seawater intrusion prior to mining. This will provide the starting point to development of borefield management systems, to minimise impacts of groundwater drawdown. - Process water recovery rates should be maximised to reduce borefield supply rates and maximise the efficiency of the system - Construct ground water monitoring facilities near the HMC stockpile at the Andranangoo and Lethbridge sites. - Prevent excavation into acid sulphate soils. This will prevent acidification and resulting metals mobilisation of groundwater by PASS and ASS. - Store fuel in double-skinned isotainers and chemicals in sealed and bunded facilities. This bunding will contain any potential fuel spills in the facility. - Fuel spills will be treated using a spill response kit that will be stored at the site. - No refuelling or maintenance of aircraft to be carried out at the ALA, except in exceptional or emergency situations when spill trays and spill response kits will be used to prevent ground contamination. - Prohibit fuel storage at ALA. Store any small volumes of aviation fuel, to be available for ALA emergency or special circumstances use, in the existing fuel storage area at the mine site.
Monitoring	Fluctuations in groundwater levels. Borefield abstraction rates and quality Process water recovery rates and quality. Ground water salinity variations between the coast and borefields. Biological monitoring may be required to assess any impacts of the borefield, especially in areas where a lowered water table could occur. As part of the Flora EMP vegetation monitoring will be conducted in the <i>Melaleuca</i> woodland to assess effects of groundwater drawdown on species composition and tree growth parameters. This, combined with the above monitoring of groundwater bores, will provide a means of assessing the impacts of mining on the health of sensitive ecological systems.
Reporting	The results of Matilda's ground water quality monitoring program will be documented in Matilda's Annual Report of performance against the MMP, along with results of vegetation surveys identifying any ecological impacts from groundwater drawdown. Where an incident causes or threatens to cause pollution resulting in material or serious environmental harm DPIFM be informed within 24 hours of becoming aware of the incident as per the requirements of the Mine Management Act 2001.
Corrective Actions	The following will be classified as an incident or failure to comply in relation to ground water management: - Seawater intrusion at Andranangoo - Groundwater contamination - Impacts on vegetation. It is noted that abstraction rates from borefields can be altered to mitigate groundwater drawdown effects and prevent further impacts. All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures.
Relevant Legislation and Standards	Matilda's Environmental Policy <i>Mine Management Act 2001</i> <i>Waste Management and Pollution Control Act</i> (only applies off the Mining Lease – Mine Management Act applies on lease) <i>Water Act</i> ANZECC Guidelines for Fresh and Marine Water Quality 2000 NHWQRC 2004 Australian Drinking Water Guidelines

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17.4 Waste Environmental Management Plan

Objectives and Targets	To minimise and mitigate potential environmental impacts associated with the generation and disposal of waste from proposed operations. To promote the efficient use of resources and minimisation of waste generation and disposal.
Actions	- Domestic type waste arising from the camp (including kitchen and office waste) will be collected in 205-L drums, and periodically burnt and disposed of in a small sanitary landfill trench adjacent to the infrastructure area. The trench will be dug with a backhoe, and covered with earth following burning to discourage birds and animal access. Upon completion of mining the disposal trench area will be covered and surface turned to encourage revegetation. - Miscellaneous vehicle waste (tyres, batteries, scrap parts) will be collected for return to Darwin for appropriate recycling and / or disposal. - Waste oil will be collected in 205-L drums identified as waste oil, and other oily wastes including generator set oil, oil filters and rags will also be placed in 205-L drums identified as oily wastes. On site these wastes will be stored on the fuel storage bund. AFD will then take waste oil off site for storage at the oily waste storage facility at Port Melville before shipping to the mainland for appropriate disposal. - Any chemical waste (very minor quantities) will be collected in a 205-L drum identified as chemical waste. It is proposed that these wastes will be taken to Port Melville for collection by a waste recycling and disposal contractor (Drum Muster). - The septic tank system with associated soakage trench for the camp kitchen and ablution areas will be covered and appropriate chemicals applied to reduce the chance of spread of disease and the likelihood of a mosquito breeding ground. Matilda will comply with the NT Code of Practice for small on-site sewage and septic systems. - A septic system has been installed at the Andranangoo site by a licensed Plumber for previous exploration activities. The Tiwi Island Environmental Health Officer has been notified and can inspect the site at any time. If any expansion to the waste water system is needed in future a Hydraulic Consultant will be engaged, and the Tiwi Island Environmental Officer consulted. - Tailings from the process will comprise clean sand rejected from the minerals separation process. All clean sand tailings will be returned to the previously mined areas for rehabilitation. - Inert waste from the ALA, such as packaging and domestic waste, will be collected and disposed of in the Andranangoo landfill.
Monitoring	Inspections of waste facilities will be conducted on a monthly basis. Inspections of septic systems and sewage disposal systems will be undertaken as per manufacturer requirements.
Reporting	The Environment Coordinator will record and sign off on monthly inspections of waste management and septic systems. The results of Matilda's waste management program will be documented in Matilda's Annual Report of performance against the MMP. Where an incident causes or threatens to cause pollution resulting in material or serious environmental harm DPIFM be informed within 24 hours of becoming aware of the incident as per the requirements of the Mine Management Act 2001.
Corrective Actions	The following constitute incidences or failures to comply in relation to waste management policies: - Unnecessary volumes of waste being sent for disposal. - Wastes being disposed of rather than reused or recycled where possible. - Uncontrolled waste disposal. - Non-compliance with waste tracking procedures. - Other non-compliances with the waste management plan. - Surface water or groundwater contamination. Should an incident or failure to comply occur, Matilda will:

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	Take the necessary actions to identify the causes of non-conformance with the waste management plan performance requirements. Implement all actions necessary to ensure compliance. All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures.
Relevant Legislation and Standards	Matilda's Environmental Policy <i>Mine Management Act 2001</i> <i>Waste Management and Pollution Control Act</i> (only applies off the Mining Lease – Mine Management Act applies on lease)

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17.5 Hydrocarbons and Hazardous Substances Environmental Management Plan

Objectives and Targets	To safely use, store and dispose of chemicals and hazardous goods and prevent the uncontrolled release of chemicals to the environment. To comply with relevant Australian standards (for the storage and handling of flammable and combustible liquids and dangerous goods) including: - AS 4452 The Storage and Handling of Toxic Substances; - AS 1940 The Storage and Handling of Flammable and Combustible Liquids; and - AS 3740 The Storage and Handling of Corrosive Substances.
Actions	- All hazardous and dangerous goods will be handled and stored according to the information provided on the MSDSs, the Australian Standards for the storage and handling of flammable and combustible liquids (AS 1940 – 1993) and the Australian Standards for the storage and handling of corrosive substances (AS 3780 – 1994). - Appropriate bunded storage and refuelling areas for fuels and dangerous goods will be provided. These facilities will be inspected on a regular basis and maintained to ensure compliance with Australian Standards. - Waste oil would be collected in 205-L drums identified as waste oil. Other oily wastes including generator set oil, oil filters and rags would also be placed in 205-L drums identified as oily wastes. On site these wastes would be stored on the fuel storage bund. AFD will then take waste oil off site for storage at the oily waste storage facility at Port Melville before shipping to the mainland for appropriate disposal. - Matilda personnel will have access to safety equipment required for the correct handling of hazardous goods and Matilda has developed spillage clean-up procedures as well as spill stations in the event of a spill. - Controls will be implemented to ensure all transfer of fuels and chemicals is managed to prevent spillage inside bunded areas. - Any spills will be cleaned up immediately. - Contaminated runoff and contaminated soil will be collected and remediated or transported to a suitable facility for disposal on the mainland. - No refuelling or maintenance of aircraft to be undertaken at the ALA, except in exceptional or emergency situations when spill trays and spill response kits will be used to prevent contamination. - Prohibit fuel storage at ALA. Store any small volumes of aviation fuel, to be available for emergency or special circumstance use, in the existing fuel storage area at the mine site.
Monitoring	Inspections of storage tanks and bulk containers and the integrity of bunded areas, pavement and associated containment systems will be conducted on a monthly basis. Surface water monitoring program. Groundwater monitoring program.
Reporting	The Environment Coordinator will record and sign off on monthly inspections of containers, bund integrity, valves and storage and handling areas. The results of Matilda's hydrocarbon and hazardous goods management program will be documented in Matilda's Annual Report of performance against the MMP. Where an incident causes or threatens to cause pollution resulting in material or serious environmental harm DPIFM be informed within 24 hours of becoming aware of the incident as per the requirements of the Mine Management Act 2001.
Corrective Actions	The following constitutes an incident or failure to comply in relation to fuels and dangerous goods management: - A fuel or chemical spill. - Storage areas not meeting Australian Standards. - Storage areas not containing suitable bunding. - Release of fuels or chemicals to the environment. Should an incident occur, a selection of the following corrective actions will be undertaken as appropriate:

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	• Contain and clean up spilt material immediately and remediate or appropriately dispose of contaminated material. • Repair containments systems. • Relocate fuel to appropriately bunded or approved storage areas. • Implement procedures or measures to avoid recurrence. All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures. Where an incident causes or threatens to cause pollution resulting in material or serious environmental harm DPIFM be informed within 24 hours of becoming aware of the incident as per the requirements of the Mine Management Act 2001.
Relevant Legislation and Standards	Matilda's Hydrocarbon and Chemical Management Procedures <i>Dangerous Goods Act</i> <i>Waste Management and Pollution Control Act</i> (only applies off the Mining Lease – Mine Management Act applies on lease) Australian Standards for the storage and handling of flammable and combustible liquids (AS 1940 – 1993) Australian Standards for the storage and handling of corrosive substances (AS 3780 – 1994)

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17.6 Emissions (Air Quality, Dust and Noise) Environmental Management Plan

Objectives and Targets	To minimise dust from construction and mining activities. To minimise potential noise issues related to the operations and to mitigate any potential noise impacts. To minimise dust emission complaints. To minimise greenhouse gas emissions.
Actions	- The mine, ALA and haulage road is well away from populated areas. The road will be maintained to ensure its suitability for use and will be regularly watered from water bores along the haul road. The ALA would be watered down as required. - Areas disturbed by mining will be rehabilitated progressively which will reduce dust generation from exposed areas. - If dust does become an issue to the local community Matilda will put in place a monitoring program and initiate further actions to suppress the amount of suspended particles emitted to the atmosphere. - To reduce the amount of noise emitted from the mining operations, the excavation of the sands will only take place in daylight hours. Staff and contractors will also be prohibited from using the beaches adjacent to the mining areas. - All vehicles and machinery under the control of Matilda will be fitted with efficient silencers to reduce the amount of noise emitted. - All cabins will be closed and air conditioned to reduce the effects of noise on employees. - Employees will be allocated earmuff/plugs to further reduce the effects. - Power supply generators will be silenced and located away from camp areas. - Mining operations and rehabilitation will be progressively staged so as to mitigate against dust and noise emissions. - The operational greenhouse gas emission estimates provided in the proposal will be adopted as initial emissions targets.
Monitoring	A dust and noise monitoring program will be implemented if emissions get to an unacceptable level.
Reporting	The results of Matilda's air quality and noise management and monitoring program will be documented in Matilda's Annual Report of performance against the MMP. Any complaints will be documented in the complaints register, investigated and reported to Matilda's Project Manager. Where an incident causes or threatens to cause pollution resulting in material or serious environmental harm DPIFM be informed within 24 hours of becoming aware of the incident as per the requirements of the Mine Management Act 2001. Matilda will join the Australian Government's Greenhouse Challenge Plus program for reporting greenhouse emissions and achieving ongoing improvement in emissions management.
Corrective Actions	The following would constitutes an incident or failure to comply in regards to air quality and dust management: - Proposed dust mitigation strategies not being implemented. - Emission concentrations exceed guideline levels. - Receipt of a noise or an air quality complaint. - Complaints received about excessive noise at the accommodation village or at sites off-lease. Should an incident or failure to comply occur, Matilda will: - Identify the source of the noise. - If appropriate, implement a noise monitoring program. - Take the necessary actions to identify the causes of the non-conformance. - Implement all actions necessary to ensure compliance. All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures.

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Relevant Legislation and Standards	Matilda's Environmental Policy Matilda's Safety and Health Policy <i>Work Health Act</i> <i>Soil Conservation and Land Utilisation Act</i> <i>Waste Management and Pollution Control Act</i> (only applies off the Mining Lease – Mine Management Act applies on lease) Motor Vehicles (Standards) Regulations - Australian Vehicle Standards Rules AS 1055.1 1997 – Acoustics – Description and measurement of environmental noise – General procedures measurement of environmental noise – General procedures Australian Government Greenhouse Challenge Plus Program
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17.7 Flora Environmental Management Plan

Objective and Targets	To minimise the area of land disturbed and to minimise the area of land that is cleared at any point by proposed operations. To avoid disturbing areas that have been found to contain species protected under the EPBC Act 1999 and TPWC Act 2000, where possible. To avoid disturbing vegetation communities considered as having conservation significance, and environmentally sensitive areas. To prevent disturbance of flora outside of designated construction and operational areas. To progressively rehabilitate mining areas within one season of disturbance as per the requirements of the Mine Closure and Rehabilitation Plan.
Actions	- Minimise areas of disturbance. - Establish program for identifying listed annual species that could possibly occur within the proposed mining areas. - Identify areas that are not to be disturbed for conservation reasons and ensure that staff and contractors are aware of restrictions, including any species identified as part of the pre-disturbance survey. Where species are to be disturbed specialist advice will be sought from a suitably qualified professional and discussed with NRETA prior to any action. - Stockpile soil and vegetation prior to mining. - Reinstate soil and vegetation within one season to maximise chances of re-colonisation from seed bank. - Identify and target key flora species for revegetation and seeding programs. - Maintain a buffer zone of at least 50m combined with additional protective mechanisms (such as silt curtains and firebreaks) adjacent to swamps, wetlands, mangroves, creeks and rivers to prevent any potentially negative impacts of mining upon these habitats. In particular, 20m buffer zones with additional protective measures will apply to the brackish swamp at Lethbridge Bay and the freshwater spring at Andranangoo. - Maintain a buffer zone of at least 20m from the drainage line leading from the permanent spring at the Andranangoo deposit, with engineering measures added to increase the effectiveness of the vegetation buffer. - Maintain a minimum buffer distance of 200m from the beach areas to the mining areas to protect sea turtle nesting beaches. - Develop mitigation measures should impacts on vegetation from groundwater drawdown be identified. - ALA: ensure clearing is kept to a minimum and limited to the dimensions required to comply with CAAP 92-1(1). A handheld GPS tracker to be used to identify clearing area boundaries. - ALA: If ALA to be handed over to TLC, burn cleared vegetation in stockpiles when dry. If rehabilitation of the ALA is anticipated at the time of construction, retain vegetation in stockpiles for respreading in the future during ALA rehabilitation..
Monitoring	Establish a vegetation monitoring program that includes pre- and post-mining flora surveys to advise rehabilitation programs and biannual assessment of the effectiveness of vegetative buffers and extent of mining impacts. This includes monitoring of species composition and tree growth parameters in the Melaleuca woodland to assess potential groundwater drawdown impacts on vegetation. Weed monitoring will be included in vegetation monitoring program (discussed in Pest, Weed and Disease EMP) for both mine and haul road areas as agreed with NRETA.
Reporting	The results of Matilda's flora management and monitoring program will be documented in Matilda's Annual Report of performance against the MMP. Any listed species identified as part of the pre-disturbance survey or ongoing surveys to be reported to NRETA.
Corrective Actions	The following constitutes an incident or failure to comply: - Unauthorised disturbance of vegetation outside of the designated area (including buffer zones). - Unauthorised disturbance of protected species.

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	Evidence of weed infestation. All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures.
Relevant Legislation and Standards	Matilda's Environmental Policy <i>Weed Management Act 2001</i> <i>Plant Diseases Control Act</i> <i>Territory Parks and Wildlife Conservation Act</i> <i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>

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17.8 Fauna Environmental Management Plan

Objectives and Targets	To minimise impact of proposed operations on local fauna, and to progressively rehabilitate mined areas as soon as practicably possible. To avoid disturbing areas that have been found to contain species protected under the EPBC Act 1999 and TPWC Act 2000, CAMBA, JAMBA and the Bonn Convention, where possible. To prevent the introduction and spread of feral animals, in particular cane toads and feral ants. To progressively rehabilitate mining areas within one season of disturbance as per the requirements of the Mine Closure and Rehabilitation Plan.
Actions	• Minimise areas of disturbance. • Identify areas that are not to be disturbed for conservation reasons and ensure that staff and contractors are aware of restrictions. • Survey areas identified as being inhabited by Butler's Dunnart along Lethbridge haul road and investigate options for realigning the road to avoid disturbance. • Survey areas within mine sites that are found to be inhabited by masked owl and develop procedures to prevent and monitor impacts on this species including the establishment of temporary 100m buffer zones around active nesting sites. • Return old logs salvaged from cleared areas to rehabilitated areas to facilitate recolonisation of areas by local fauna (including birds). • Identify and target key fauna species for recolonisation of rehabilitated areas where appropriate. • Maintain a buffer zone of at least 50m adjacent to swamps, wetlands, mangroves, creeks and rivers to prevent any potentially negative impacts of mining upon these habitats. • Maintain a buffer zone of at least 20m from the permanent spring at the Andranangoo deposit. • Maintain a minimum buffer distance of 200m from the beach areas to the mining areas to protect sea turtle nesting beaches. • ALA: ensure clearing is kept to a minimum and limited to the dimensions required to comply with CAAP 92-1(1). A handheld GPS tracker to be used to identify clearing area boundaries. • Install and monitor cane toad traps around the perimeter of the ALA in conjunction with TLC. In addition where practicable and safe to do so drivers are to: • Assist wildlife injured or orphaned by transportation activities. • Remove dead animals from the road, to help prevent follow-on injuries to scavenging wildlife or further traffic incidents from the carcass. • Check for surviving young in pouches or at the scene if parents are killed. • Contact wildlife authorities where fauna are injured, especially if there is likely a need for specialist care.
Monitoring	Establishment of pre- and post-mining surveys to assess the effectiveness of rehabilitation programs. These surveys should include searches of tree nests and hollows to be conducted pre- and during mining works (if significant species are identified fauna is either to be relocated or protected during works). Surveys will be carried out to identify any active nests of masked owls before any clearing of vegetation is to occur. If active nests are discovered, temporary 100m vegetation buffers will be provided from mine activities until the nest is no longer active. Monitoring programs will also be established to assess the impacts of operations and effectiveness of buffer zones around active nests. Further survey of Butler's Dunnart found to occur along the Lethbridge haul road prior to final alignment being agreed. Feral monitoring will be included in fauna monitoring program (discussed in Pest, Weed and Disease EMP). Monitoring of cane toad traps at the ALA.
Reporting	The results of Matilda's fauna management and monitoring program will be documented in Matilda's Annual Report of performance against the MMP.
Corrective Actions	The following constitutes an incident or failure to comply:

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	• Decline in fauna abundance and species diversity. • Disturbance to species protected under the EPBC Act 1999 and TPWC Act 2000, CAMBA, JAMBA and the Bonn Convention • Disturbance of habitats of known protected species. • Introduction or spread of feral species. All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures.
Relevant Legislation and Standards	Matilda's Environmental Policy <i>Mine Management Act 2001</i> <i>Territory Parks and Wildlife Conservation Act</i> <i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i>

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17.9 Pests, Weeds and Disease Environmental Management Plan

Objectives and Targets	To minimise the impacts on local flora and fauna. To prevent introduction of feral animals (including cane toads, ants and dogs), and other exotic fauna and flora species. To progressively rehabilitate mining areas within one season of disturbance as per the requirements of the Mine Closure and Rehabilitation Plan.
Actions	• Work with the appropriate authorities on the Island and the barging service to ensure weedy seed or plant material is not accidentally transported onto the Island. • Develop internal procedure to ensure that these quarantine requirements are met. • Install and monitor cane toad traps around the perimeter of the ALA in conjunction with the TLC. • Ensure no fresh water open containers are present in camp area (minimise potential for mosquito breeding areas). • Implement feral animal eradication programs at proposed sand mining sites, camp and ALA where appropriate. • Implement weed eradication program at proposed sand mining sites, camp and ALA where appropriate. This will include developing guidelines for quick identification of weed species. • Weed management programs in areas where weeds are known to occur will focus on the containment of weed species to areas of known infestations where they can be managed by Island authorities through quarantine procedures.
Monitoring	Vegetation monitoring program including weed monitoring program for both mine, ALA and haul road areas as agreed with NRETA. Vegetation monitoring will be conducted by independent experts, and will include weed surveys and recommendations for preventative actions and continual improvement of weed control programs. Fauna monitoring program including feral animal monitoring program.
Reporting	The results of Matilda's pest, disease and weeds management and monitoring program will be documented in Matilda's Annual Report of performance against the MMP and a copy will also be provided to NRETA.
Corrective Actions	The following constitutes an incident or failure to comply: • Evidence of weed infestation or feral pest presence. All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures.
Relevant Legislation and Standards	Matilda's Environmental Policy <i>Territory Parks and Wildlife Conservation Act</i> <i>Environmental Protection and Biodiversity Conservation Act 1999 (Cth)</i> <i>Weeds Management Act 2001</i>

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17.10 Fire Environmental Management Plan

Objectives and Targets	To minimise or avoid the impacts of fire. To develop a fire management strategy in consultation with the TLC. To implement a 'No unauthorised fire' policy within the camp and sand mining area.
Actions	• Fire breaks will be maintained around the perimeter of the camp, processing areas and ALA on a half yearly basis. • Size of buffering and any reduction burning will be agreed with the chief officer prior to the onset of operations. • Matilda will avoid weeded areas around the historically disturbed areas to prevent the introduction of weeds to the mining area. • A 'no unauthorised fire' policy will be adopted in the camp and processing area to reduce the risk of accidental fire to the camp, processing area and surrounding areas. In the case of fire in the camp or processing area the OHS procedures will be followed.
Monitoring	Regular monitoring of fire breaks and fire fighting equipment.
Reporting	The results of Matilda's fire management and monitoring program will be documented in Matilda's Annual Report of performance against the MMP.
Corrective Actions	The following constitutes an incident or failure to comply: • Fire management program not prepared or implemented. In the event of a failure to comply, investigations will be undertaken into the cause of the incident or failure to comply and the appropriate action taken to overcome the problem. All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures.
Relevant Legislation and Standards	<i>Fire and Emergency Act</i> <i>Bushfires Act</i> <i>Territory Parks and Wildlife Conservation Act</i>

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17.11 Biting Insects Environmental Management Plan

Objectives and Targets	To prevent increases in the number of new mosquito breeding sites as a result of proposed sand mining operations. Prevent the transmission of mosquito-borne diseases as result of proposed sand mining operations.
Actions	- Any depressions created in the ground surface will be filled or drained to prevent the ponding of water. - Storage containers capable of ponding water will be either discarded after use or stored in an inverted position (care will be taken to ensure that ponding does not occur in rubbish storage areas). - Ensure no fresh water open containers are present in camp area (minimise potential for mosquito breeding areas). - Inspect ponds and on-site excavations filled with water for the presence of mosquito larvae. If larvae are detected, the Medical Entomology Branch of NT Health will be consulted on what actions should be taken. - Rehabilitate mining areas in a manner that prevents the creation of new mosquito breeding sites. - Drainage channels/spoon drains will be kept as shallow as possible to prevent ponding. - Staff and contractors will be made aware of the potential risk of mosquito borne disease and the high risk periods (late dry to post wet). - Staff and contractors will be advised to wear long sleeved shirts and trousers, avoid going outside at sundown, and to use insect repellent. Insect repellent will be provided at work sites. - Workers will be educated about the early symptoms associated with exposure to mosquito-borne arbovirus and will be instructed on the need to report any symptoms to a medical officer. - On-site accommodation facilities will be screened and air conditioned. Lights will be fitted with yellow bulbs to discourage mosquitoes.
Monitoring	Biting insect monitoring program.
Reporting	The results of Matilda's biting insects management and monitoring program will be documented in Matilda's Annual Report of performance against the MMP. Any significant mosquito activity will be reported to Matilda's General Manager and/or the Medical Entomology Branch.
Corrective Actions	The following represent an incident or failure to comply: - Mosquito breeding sites are created by construction activities. - Excessive numbers of larvae and/or mature mosquitoes are evident on-site. - Significant incidences of mosquito bites are reported. - Confirmed infection by Ross River or other mosquito-borne disease. Should an incident or failure to comply occur, a selection of the following actions will be taken: - Employees will be re-educated on desired practices. - Work policies and procedures will be changed to improve the situation. All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures.
Relevant Legislation and Standards	Matilda's Environmental Procedures

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Environmental Management Plans

17.12 Sea Turtles Environmental Management Plan

Objectives and Targets	To prevent impact from construction and mining activities on sea turtles behaviour on beaches adjacent to the mining areas.
Actions	• Access to turtle nesting beaches will be restricted to sea turtle monitoring activities only. • A 200-m buffer zone will be used to provide a physical barrier between the proposed mining operations and the sea turtle nesting beach. • Mining operations will be undertaken during the day shift only. (The only equipment that will operate during the night will be the feeder and a corresponding loader in the mining area. The processing plant will operate 24 hours a day but this is to be located on the escarpment.) • Orange and red lights or yellow low-pressure sodium vapour lamps will be used wherever possible for external lighting, except where safety considerations require other coloured lights, to minimise potential light impacts. • Where white and other coloured lights, including fluorescent lights, are used, the light spill will be reduced by either shades or orientation. There will be minimal light visible from the beach where the sea turtles nest. No lights will face seawards except for those required for safe operation of the mine site. Shades will be constructed over lights to prevent sky glow. • Lights will be low to the ground wherever possible. Pathway lights will be less than one metre in height and shaded to prevent upward illumination. Preference will be given to manually operated switches that enable selected parts of the mine site and the camp site to be illuminated separately. • Reflective tape may be used to reduce the amount of ambient light where the safety of personnel is not compromised.
Monitoring	Sea turtle monitoring program.
Reporting	The results of Matilda's sea turtle management and monitoring program will be documented in Matilda's Annual Report of performance against the MMP. Reports will also be supplied to the Tiwi Land Council, Office of Environment and Heritage, Biodiversity Conservation Division, and Department of Environment and Heritage.
Corrective Actions	If mining activities are deemed to have an adverse effect on sea turtle numbers, then immediate steps will be taken to mitigate impacts and implement required corrective actions. All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures. Incidents relating to sea turtles will also be documented as part of Matilda's turtle monitoring program.
Relevant Legislation and Standards	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cth)</i> <i>Territory Parks and Wildlife Conservation Act</i> National Strategy for the Conservation of Australian Species and Communities Threatened with Extinction National Strategy for the Conservation of Australia's Biological Diversity 1996 IUCN Red List of Threatened Species 2000

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Environmental Management Plans

17.13 Radiation Environmental Management Plan

Objectives and Targets	To prevent any damage to the environment or to personnel through appropriate monitoring and management strategies.
Actions	• Appointment of a Radiation Officer • Compliance with the requirements of Matilda's Radiation Management Plan. • Conduct all operations in accordance with relevant Guidelines and Codes of Practice. • Monitor soil radon flux and gamma levels at both Andranangoo and Lethbridge for the first year of operation in order to ensure that doses are kept below harmful limits and to advise rehabilitation monitoring programs. After the first year of operation Matilda will evaluate the need radiation monitoring and management program and revise as appropriate in consultation with DPIFM.
Monitoring	Radon and gamma monitoring program.
Reporting	The results of Matilda's radiation management and monitoring program will be documented in Matilda's Annual Report of performance against the MMP. Where an incident causes or threatens to cause pollution resulting in material or serious environmental harm the EPA must be informed within 24 hours of becoming aware of the incident as per the requirements of the Waste Management and Pollution Control Act 1998.
Corrective Actions	The following constitutes an incident or failure to comply: • Evidence of impacts on personnel and/or environment. • Increases in radon and gamma measurements recorded in radiation monitoring program. All incidents will be reported and managed through to resolution via Matilda's incident reporting procedures.
Relevant Legislation and Standards	Matilda's Environmental Policy Matilda's Safety and Health Policy <i>Radiation (Safety Control) Act 1999</i> <i>Radioactive Ores and Concentrates (Packaging and Transport) Act</i> <i>Public Health Act</i> <i>Work Health Act</i> <i>Waste Management and Pollution Control Act</i> (only applies off the Mining Lease – Mine Management Act applies on lease) Code of Practice on Radiation Protection in the Mining and Milling of Radioactive Ores 1987

Section 18

Commitments

The following is a summary of the Matilda's commitments to specific management actions to manage environmental risks during construction and operation of the ALA, as described in PER Sections 4 to 15:

18.1 Landform, Soils and Hydrology

Matilda commits to installing stormwater drains and turn-outs along each edge of the Runway at the ALA.

Matilda commits to expanding the existing soil erosion monitoring program to include the ALA.

Matilda commits to implementing existing EMP's for surface water quality, groundwater quality, and hydrocarbons and hazardous substances.

Matilda commits to the storage and handling of hazardous substances in accordance with Australian Standard 1940, and with the Hydrocarbons and Hazardous Substances EMP.

If rehabilitation of the ALA is preferred at the time of mine closure, Matilda commits to reinstating the natural ground surface, removing surface water drains and other features, and deep ripping and seeding the ALA site.

18.2 Flora

Matilda commits to using hand-held GPS units to identify clearing boundaries during construction of the ALA, to avoid accidental over-clearing.

Matilda commits to collecting cleared vegetation during ALA construction into designated areas, to minimise the impact of dumping on the surrounding vegetation. This material would be burnt when dry, or if the ALA is to be rehabilitated after mine closure, the material would remain stockpiled for respreading during rehabilitation.

Matilda commits to including the ALA in the existing vegetation monitoring program, to allow for early detection of weeds in the area. Where weeds are identified, Matilda commits to applying appropriate weed control measures throughout the ALA, camp and mine site, to minimise weed spread and eradicate weeds where possible.

Matilda commits to developing weed identification and awareness training for mine personnel.

Matilda commits to participating in the island-wide weed management program in cooperation with TLC and Great Southern Plantations.

18.3 Fauna

Matilda commits to collecting cleared vegetation during ALA construction into designated heaps, to minimise the impact of dumping on the surrounding vegetation.

Matilda commits to installing and monitoring cane toad traps around the perimeter of the ALA.

Matilda commits to including the ALA in the existing feral ant monitoring program.

18.4 Archaeology and Heritage

Matilda commit to communicating the possibility of grave sites in the area to mine staff, through the site induction process.

Matilda commits to instructing mine personnel to cease work and contact the Matilda HSEC Officer if a suspected grave site or any archaeological material is observed. The HSEC Officer will contact NRETA Heritage Conservation Services or the TLC for advice, before giving approval for works to proceed.

Section 18

Commitments

18.5 Air Quality and Noise

Matilda commits to conducting ALA construction during daylight hours only.

Matilda commits to incorporating the ALA into the existing Fire Management Plan, to minimise the risk of large wildfires that could cause intense smoke.

18.6 Traffic and Transport

Matilda will impose existing traffic management procedures, such as avoidance of weed infested areas, during ALA construction.

18.7 Waste and Hazardous Substances

Matilda commits to applying the management actions included in the existing Waste EMP and Hydrocarbons and Hazardous Waste EMP to the construction and operation of the ALA.

Matilda will not store any fuel or oil at the ALA site, and only small volumes of fuels or oils required for aircraft for emergency or special circumstances will be stored at the existing bunded facility at the mine site.

Matilda commits to piling vegetation debris and topsoil removed during ALA construction into heaps to minimise impacts to the surrounding vegetation. These heaps would either be burnt or retained for later rehabilitation of the ALA, should the decision be made during the PER process to remove the ALA after completion of mining.

18.8 Greenhouse Gases

Matilda commits to using hand-held GPS units to identify clearing boundaries during construction of the ALA, to avoid accidental over-clearing.

Matilda commits to coordinating flight schedules as efficiently as possible to minimise the number of flights per week, and to utilise larger planes that are more efficient in "per passenger" fuel use.

Matilda has joined the Greenhouse Challenge and commits to continuing to reduce greenhouse emissions where possible.

18.9 Biting Insects

Matilda commits to constructing the ALA in accordance with the DHCS Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites.

Matilda commits to continuing to provide advice on biting insect risks and personal protective equipment (such as insect repellent) to all mine personnel and visitors.

18.10 Socio-Economic

Matilda commits to continuing a close working relationship with the TLC, to identify opportunities to contribute positively to the Tiwi Islands' economy and society.

Matilda commits to leaving the ALA in sound operational conditions at the end of mining, should it be confirmed as a result of this PER process that the ALA should remain as a future asset to the Tiwi Islands community.

18.11 Stakeholder Consultation

Matilda commits to continuing stakeholder consultation throughout the PER public review period for the ALA project.

Section 18**Commitments**

Matilda commits to maintaining open and regular communication with the TLC and relevant land-owning groups throughout the construction, operation and rehabilitation phase of the ALA and the Andranangoo mining project.

18.12 Risk Assessment

Matilda will continue to systematically evaluate the HSEC risks associated with the proposed ALA through the construction, operation and maintenance phases of the project. These will be documented in the site HSEC Aspects and Impacts Register.

Matilda will implement management actions for the ALA as detailed in Table 15.4, including EMP's and other procedures.

Section 19**Acknowledgements****Project Team**

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Section 21

Limitations

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The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

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