Background

Matilda Minerals Limited (Matilda) proposes to mine mineral sands at Andranangoo Creek West (Andranangoo) and Lethbridge Bay West (Lethbridge), Melville Island, Tiwi Islands, Northern Territory. The proposed operation will extract high-grade heavy minerals, specifically zircon and rutile, for export to China. It is estimated that a total of 107,000 t of zircon and rutile will be exported during the anticipated mining operation of three and a half to four years. This zircon and rutile will be shipped directly from Port Melville on Melville Island, to China. The general project locations, and those of the Andranangoo and Lethbridge tenements, are shown in Figures 1 and 2 respectively.

Andranangoo is a new discovery and the first priority for Matilda and would be mined first, followed by Lethbridge. The heavy mineral (HM) content of the Andranangoo prospect is 3.6% up to a depth of 2 m and is associated with alternating littoral (shore), fluvial (river) and estuarine deposits. It is estimated that approximately 2,700,000 t of sand will be extracted and processed at the Andranangoo Creek West Deposit, which will contain approximately 88,000 t of HM.

Figure 1: Location of Tiwi Islands

The HM content of the Lethbridge Bay West prospect is 5.1%. Mineral sands mining will commence at Lethbridge after operations are complete at Andranangoo, therefore exploration undertaken to date at Lethbridge has been less intensive. It is however estimated that approximately 410,000 t of sand will be extracted and processed at the Lethbridge Deposit, which will contain 19,000 t of HM.

The principal objective of this Draft Environmental Impact Statement (Draft EIS) is to identify and assess the environmental and related impacts that could potentially occur as a result of the proposed mineral sands mining operations at Andranagoo and Lethbridge, and to develop and describe management strategies that will be employed to manage and mitigate those impacts.

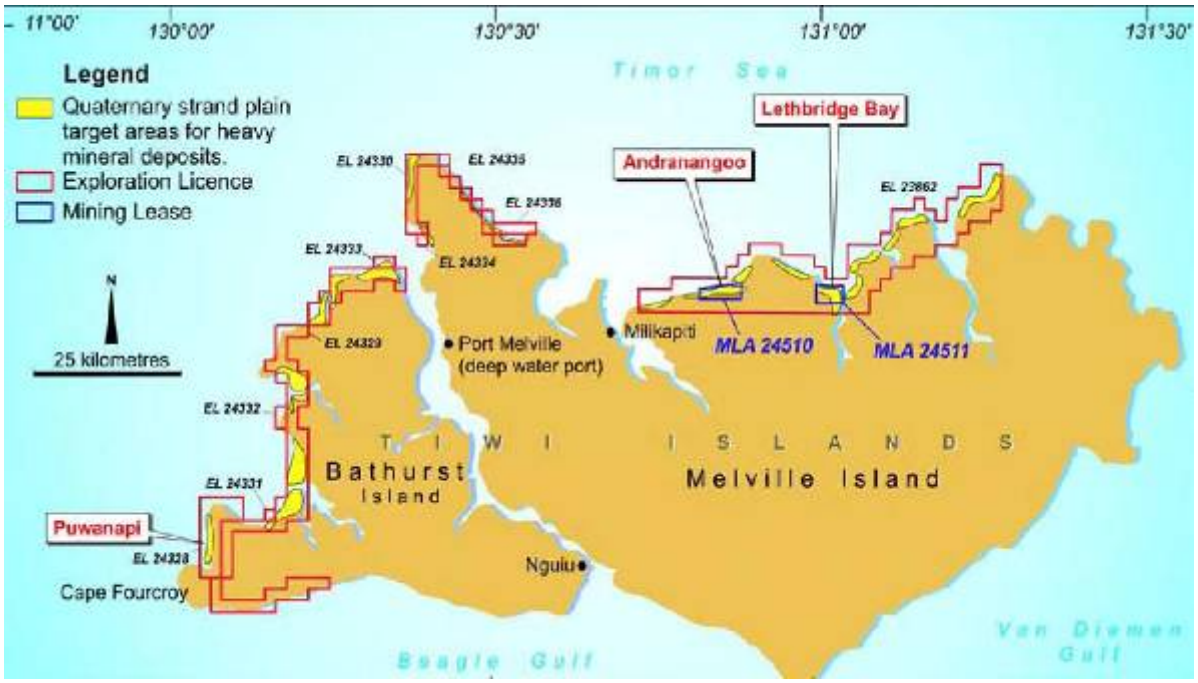

Figure 2: Tenement Locations

Matilda is cognisant that without the support of the local community it is unlikely that the proposal would be successful. Matilda therefore consulted with the Tiwi Land Council (TLC) and local Traditional Landowners prior to commencing exploration on the Tiwi Islands. These consultations, and subsequent consultations undertaken as the project has progressed, have indicated overwhelming local support for the project. Details of the consultation program undertaken by Matilda to date, as well as consultations specifically undertaken as part of the development of the EIS, are also included in this Draft EIS.

Areas of disturbance

It is estimated that the area of disturbance at Andranagoo will be 0.45 km^2 (45 ha); (this is approximately 0.006% of the total land area of the Tiwi Islands). Total area of the Tiwi Islands is estimated at 7345 km^2 derived from Woinarski *et al.* (2003a). The habitats to be disturbed are predominantly *Melaleuca* woodland, with approximately 2 ha in *Eucalyptus* open woodland for the camp. At Andranangoo the estimated life-of-mine is approximately three to three and a half years.

It is estimated that the area of disturbances at Lethbridge will be 0.20 km^2 (20 ha); (this is approximately 0.003% of the total land area of the Tiwi Islands). The habitats to be disturbed are predominantly *Melaleuca* woodland with minor areas of coastal vine thicket and strand (beach edge) communities at Lethbridge. (Metcalfe 2005a) An additional 2 ha of *Eucalyptus* open woodland will be disturbed for the processing plant and camp. The estimated life-of-mine at Lethbridge is approximately six months, subject to subsequent exploration.

In addition to the mine sites, the widening of the existing 4WD tracks from the main road across Melville Island to the mine sites is an additional disturbance, primarily to *Eucalyptus* woodland. The total area of disturbance involved, in increasing the track width from 2 to 6 m, is about 0.44 km^2 (44 ha), comprising 24 ha for the Andranangoo access and 20 ha for the Lethbridge access. It is noted that the upgrading of the existing track to Andranangoo has been undertaken by the Tiwi Island Local Government (TILG), who were contracted by Matilda with the approval of the TLC and local land owners. The track was

upgraded to enable access to the area by heavy drill rigs for exploration purposes, production water boring and also to provide improved access for the landowners, as a gesture of goodwill.

Camp and plant facilities

The proposed camp and plant layout at Andranangoo is shown in Figure 3. As shown, the facilities will include a camp area with adjacent heliport for emergency evacuation, separated from the plant area. The plant area will include the main plant and camp generator, the processing plant, HM concentrate storage shed, workshop and offices. The facility will be relocated to Lethbridge once operations at Andranangoo are complete.

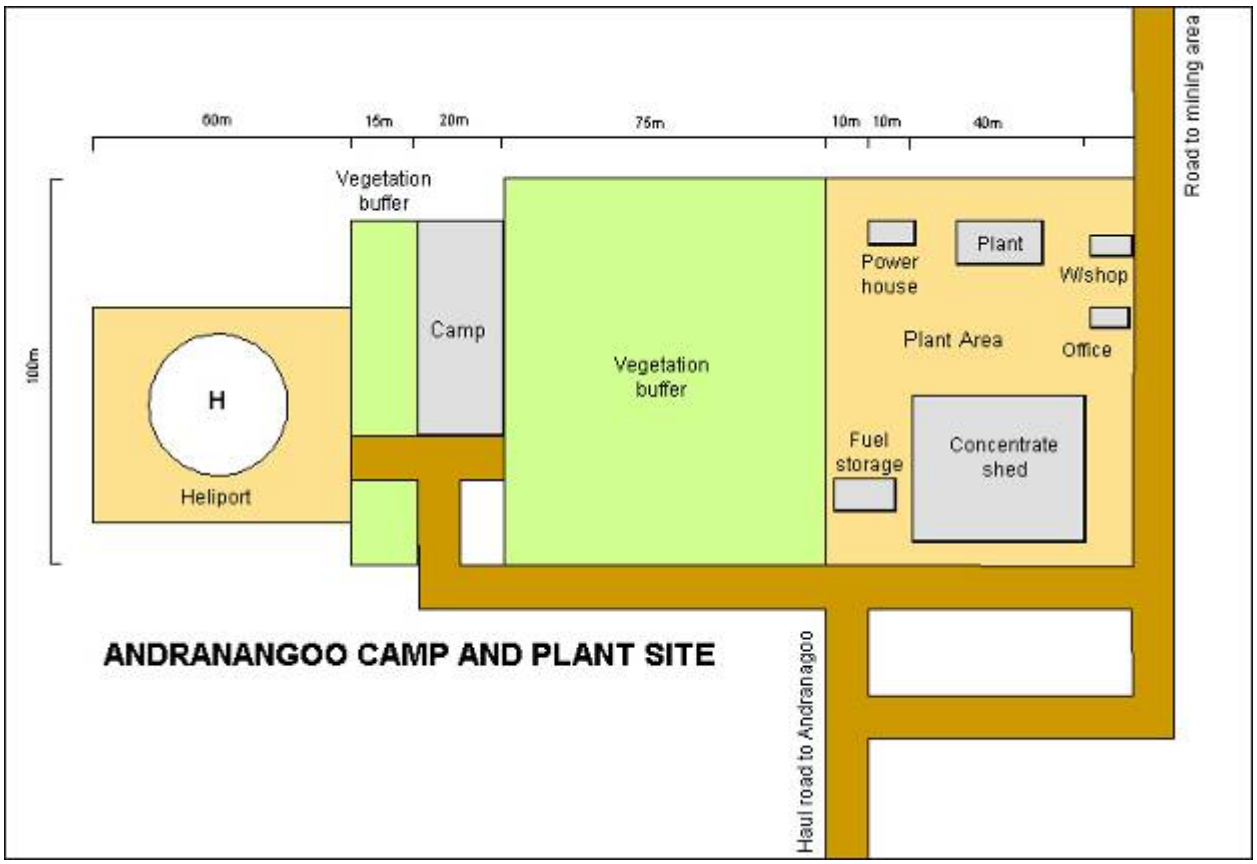

Figure 3: Andranangoo Camp and Plant Site Layout

Mining methods

The mineral sands mining method to be used at both Andranangoo and Lethbridge is a form of slot mining, which will minimise the excavation footprint at any one time. Mining will be undertaken by use of 45 t excavator, which will load into 35 t articulated six-wheel drive trucks. The excavator will dig to the base of mineralisation, or as deep as practicably possible, without the need for dewatering.

The mining face will progress at a typical rate of about 8 to 10 m per day, depending on the depth of the mineralised material. The width of the mining face will vary according to the nature of the deposit being mined, but will typically be about 80 m across. The mining methodology is shown in Figure 4.

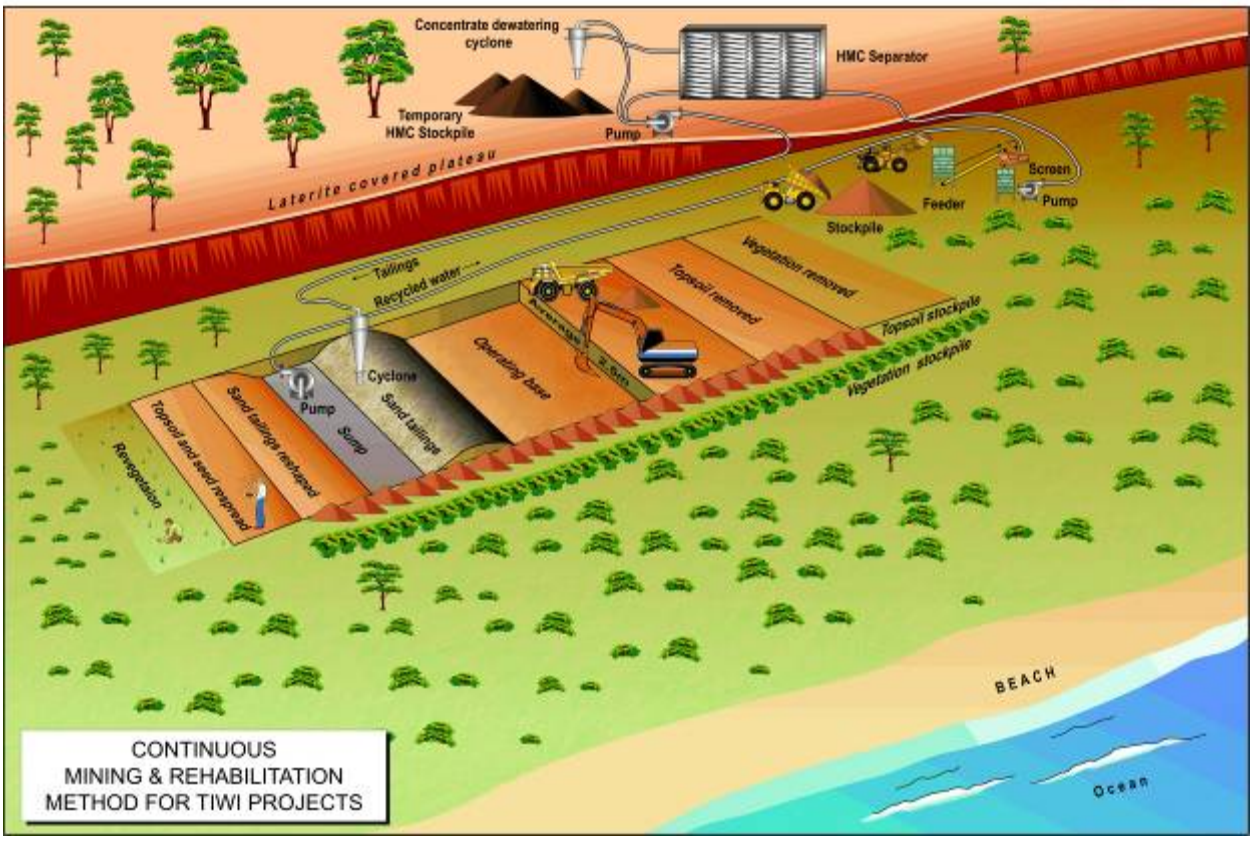

Figure 4: Diagram of Mining Method

Prior to the mining face progressing, vegetation and topsoil will be pushed separately to one side and stockpiled. When active mining of an area is complete, sand tailings will be placed back into the mined areas and the landform will be reconstructed to the original profile. It is anticipated that the resultant profile, over the original mineral sand bearing zone, will be approximately 150 mm lower than the pre-existing profile due to the extraction of the HM content of the sands. The stockpiled topsoil and cleared vegetation (brush cover) will be respread and reseeded or planted with seedlings, using species from the area to ensure that the flora provenance is preserved.

Areas of particular environmental sensitivity including; coastal vine thicket and natural springs will be avoided. A minimum buffer zone of 200 m will be maintained between the mining operations and the Spring High Water mark of beaches where turtles may nest, and a buffer zone of 50 m will be maintained between, wetlands, mangroves, rivers or creeks.

Mining activities (operation of the excavator and trucks) will run day shift only, with the feeder and associated loader operating 24 hours per day. This will assist in alleviating potential problems with lights in the areas closer to the coast, and the potential for affecting nesting turtles.

Processing plant

Mining operations will consist of excavator and truck operations dumping to a stockpile area adjacent to a feeder which will be loaded by a front end loader, screened and slurried. Slurried sand from the feed hopper will then be pumped to the HM processing plant, which will be located on the escarpment. The HM processing plant will separate the final product of HM concentrate from the sand via a spiral

centrifugal separation process. Specifically, the slurry that is piped to the plant will be fed into a series of water-irrigated spirals that separate the sand into the heavy minerals and sand tailings, by use of splitters. The splitters divert the sand tailings to a hopper, and the heavy mineral concentrate to a wash hopper.

The separation process does not require any chemicals, and will utilise recycled water for the separation of sand and HM concentrate. The method is a well established and proven method of chemical-free separation. The concentrator plant spirals section is shown in Plate 1.

Plate 1: Concentrator Plant Spirals Section

Sand tailings from the concentrator is pumped back to the pit area via dewatering cyclones. Water from the dewatering cyclones is re-used in the feed hopper, and the tailings are stockpiled at the rear of the mining area for re-shaping into the natural landform for later rehabilitation.

The concentrate is pumped from the concentrator to a dewatering cyclone, where the water is recovered for re-use in the processing plant. The HM concentrate then passes to a temporary stockpile, from where it is periodically transferred to the storage shed, awaiting trucking to the port terminal. The HM concentrate storage shed will incorporate a bunded concrete pad.

Port facilities

HM concentrate hauled to Port Melville will be stored at the port in a dedicated shed on the PenSyl port area lease. The port facility will provide for storage of up to 20,000 t of concentrate. The ore will be stockpiled in a shed to ensure that there is no release of concentrate during high wind and rainfall or cyclonic events.

Ore will be exported directly from Port Melville. Ore shipments would be in consignments of 4,000 t to 8,000 t at a time, approximately every two months. The loading and unloading of goods and ore at Port

Melville will be controlled by PenSyl Pty Ltd, and will be conducted under PenSyl's Management Procedures and Guidelines. It is proposed that concentrate will be loaded into bins on trucks using a front-end loader. The concentrate will then be emptied directly from the bins into the ship by the ships gantry.

Structure of the Draft EIS

This Draft EIS has been developed in response to Draft EIS guidelines issued by the Office of Environment and Heritage (OEH) in August 2005 and requirements of the *Northern Territory Environmental Assessment Act 2001*.

The Draft EIS includes an introductory section which provides a general introduction to the proposed project, associated benefits and justifications, a description of the alternatives and options considered during project planning, and relevant legislation and policies.

The next chapter is the project description, which provides a detailed description of the Project, including all aspects of the mine construction, operations and processes, use of materials, development of infrastructure, as well as workforce, management, maintenance and administrative requirements.

The project description is followed by a number of chapters that provide in-depth descriptions of specific environmental issues and considerations. As per the EIS guidelines, these chapters generally follow the following structure:

- descriptions of the existing environment;
- environmental objectives and standards;
- descriptions of potential environmental impacts;
- management measures associated with each environmental value or issue; and
- commitments made by Matilda to address specific issues.

Following these chapters, the draft rehabilitation and mine closure plan, and a description of the consultation program and its findings are presented.

The final chapter provides a preliminary environmental risk assessment of the potential impacts of the proposed activities, to ensure that environmental issues are assessed in context and are considered based upon their significance and priority. The outputs of the risk assessment have been incorporated into Matilda's proposed Environmental Management System (EMS). The EMS will enable Matilda to:

- systematically assess its environmental impacts and obligations and their significance;
- put Environmental Management Programs (EMPs) in place to address these impacts and obligations; and
- develop targets which will enable them to measure their environmental performance.

Matilda will base its EMS on the AS/NZ ISO14001:2004 Environmental Management System Standards. This standard has been chosen as the most recognised standard to provide Matilda with a continuous improvement framework for managing environmental impacts and obligations.

On-going environmental assessment

Under the *Mining Management Act 2001* there is a requirement for the Mine to develop a Mine Management Plan (MMP) and submit it to the Department of Primary Industry, Fisheries and Mines (DPIFM) for approval annually. This plan is the key operational document for all NT mining operations to support the Application for Authorisation of Mining Activities. The MMP aims to satisfy all legislative requirements and provides a tool that outlines actions, programs and responsibilities the mine must take to achieve a 'life-of-mine' commitment to health, safety and environment (DPIFM 2002).

Matilda intends to develop its EMS in line with the requirements of the MMP, to ensure efficient use of resources in managing its safety and environmental responsibilities, and also to ensure that annual reviews of both instruments are undertaken in parallel.

Project benefits and justification

Past and on-going consultation with the Tiwi Land Council (TLC) has indicated their recognition of the benefits of the project. The benefits of the project to the Tiwi Islanders are:

- Potential to generate income for the local community from royalties;
- Potential for employment and training of local people;
- Provision of long-term infrastructure such as roads (and cleared camp areas if the community wishes) that will remain long after the mineral sands mining project is complete;
- Potential sponsorship of community and training programs including the local nursery project and a proposed land-based Ranger project;
- Provision of water bores in country customarily used by Tiwi people; and
- Significant additional business for the Tiwi-owned international port, Port Melville.

In addition to these recognised benefits to the local community, the project will also provide benefits to the broader NT community, in the form of royalties to the NT Government, spinoffs to the local economy, employment and the provision of goods and services.

The project locations are in remote areas of Melville Island. The temporal and spatial scale of the project is small, therefore impact will be limited to the local area, which simplifies the identification and management of issues. The extensive flora and fauna surveys conducted of the proposed mining areas have added valuable information to the knowledge database of the Tiwi Islands, in particular Melville Island.

Matilda has made the information from the EIS studies readily available to the TLC and NT Government agencies. With Matilda's continued commitment to the environment and through continual monitoring of the areas in which Matilda proposes to operate, further information will be gained to add to this knowledge database.

During this process of information dissemination, the knowledge of sustainable development and of the natural environment of the Tiwi Islands within the wider community is also likely to increase. Conversely, knowledge of other industries and access to additional opportunities will also be provided to the people of the Tiwi Islands, through Matilda's presence.

If the project were not to proceed, the above opportunities to the Tiwi Islanders and to the NT generally, would be lost.

Environmental issues and management controls

Climate

The proposed mineral sands mining operations are located in the wet/dry tropics of northern Australia, which is influenced by the north-west monsoon and has two distinct seasons, a wet and a dry season. Annual average rainfall is approximately 1,600 mm. Approximately 90% of the annual rain falls between November through April, when monsoonal activity is prevalent and cyclonic activity is experienced. In the dry season, which falls between May and October, rainfall is minimal, although it exhibits greater variability compared to wet season falls.

The strongest and heaviest rains are associated with the passage of tropical cyclones, which can occur at any time during the monsoonal period from November to April. The average frequency of occurrence for the thirty year period 1969/70 to 1998/99, for the study area, is approximately 0.4 cyclones per year. The main impacts of a cyclone are wind damage, storm surge, and flooding as a result of heavy rain. Storm surge events are of particular concern to coastal communities, and management of this risk has been incorporated into Matilda's operational planning.

Solar radiation and ambient temperatures are generally high throughout the year, with the maximum daily temperature averaging 33.8^{o}C (November) and the minimum daily temperatures average 18.1^{o}C (July). Annual relative humidity average is 78% at 9 am and 60% at 3 pm.

Land tenure

The Tiwi Islands Mineral Sands Project comprises ten granted Exploration Licences (Figure 2) registered in the name of Matilda Minerals Limited (Matilda). The Licences and Applications collectively cover an aggregate area of some 790 km^2. The Draft EIS relates to mining lease applications at Lethbridge Bay West (9.11 km^2) (MLA 24511) and Andranangoo Creek West (11.63 km^2) (MLA 24510).

The Traditional Owners of the land in which the mineral leases occur are the Yimpinari Traditional Owners. This is one of eight Traditional Owner groups located on the Tiwi Islands. The Yimpinari Traditional Owners hold the largest area of land on both the islands (TLC 2004).

The current population of the Tiwi Islands is concentrated in the three main communities of Nguiu (Bathurst Island), Pirlangimpi (Melville Island) and Milikapiti (Melville Island). There are four official outstations on Melville Island - Paru (7 houses), Taracumbi (2 houses), Yimpinari (1 house) and Takamprimili (1 house). The overall built-up area on the Tiwi Islands is 19.5 km^2 on Bathurst Island and 6.2 km^2 on Melville Island (TLC 2004).

Land and resource uses in and surrounding the proposed mineral sands mining operations include tourism, forestry, fishing/aquaculture and hunting.

Landforms

The proposed mining areas are located on the low-lying coastal dune system of northern Melville Island (Figure 2), which rises to only a few metres above sea level. The coastal dune systems within and surrounding the proposed sand mining areas comprise a sequence of shore-parallel beach ridges and shore-parallel sand spits (cheniers), locally modified by tidal creeks and drainage channels that drain the hinterland plateau.

The beach ridge and chenier land unit, as described by Hollingsworth (2003) comprises predominantly silicious sands with some calcareous sands (Forsci 1999). Drainage is described as moderate, and there are limitations imposed on development by the potential for flooding.

The soils of the mining areas are described as highly leached, nutritionally poor sands with a minor humic surface horizon (the topsoil). Nutrients and moisture-holding capacity are both concentrated in the topsoil. The erosion potential for the mining areas is low to moderate. The soils of the drainage channels and basins are described as peaty organic loams (Hollingsworth 2003).

The management of physical impacts on topographic, landform and soils of the proposed mined areas will be addressed in the Rehabilitation and Mine Closure Plan (RMCP). In order to reconstruct the mined areas, the sand tailings will be dewatered and replaced in the mined areas. The tailings will be reshaped so as to re-form the original ridge and swale profile.

There will be a net loss of topographic elevation of approximately 150 mm as a result of the extraction of the mineral sands and replacement of the sand tailings, and there will need to be minor contouring of the surface profile along the edge of the mined areas. The angles of the slopes will be such that the reshaped contours are compatible with the surrounding landform, and such that erosion will be minimised and rehabilitation success will be promoted.

Investigations to assess the presence of acid sulphate soils (ASS) have been undertaken at Andranangoo. Investigations into the possible presence of ASS at Lethbridge will be undertaken as part of more detailed site work prior to mining being undertaken, however, it is expected that the results for Lethbridge will be similar to those obtained for Andranangoo. The results show "sulphate trail' levels below detection, which indicate that the soils tested were not likely to be acid forming. It is possible, however, that acid generating environments may exist near wetlands. Further analysis would be undertaken when access to these areas is available, prior to mining in these areas.

Landform

Matilda commits to restoring disturbed areas back to the original landform contours, where possible. Where this is not possible, the reshaped contours will be compatible with the surrounding landform.

Matilda commits to investigating the possible presence of ASS at Lethbridge as part of more detailed site work prior to mining being undertaken. In addition, further analysis for the presence of ASS soils would be undertaken near any wetlands, when access to these areas is available, prior to mining in these areas.

Storm surge

The proposed mining operations will not impact on the occurrence or magnitude of storm surges affecting northern Melville Island. However, being located on the low-lying beach ridge system, and adjacent to an area of shallow bathymetry, the mining areas would be considered potentially susceptible to storm surge effects. Activities associated with mining (clearing, excavations and the presence of stockpiles) may have a localised impact on the penetration of the surge inland from the shoreline and on the direction of flow.

As mining will run parallel to the shoreline, the effect on storm surge will be less than that occasioned by clearing areas perpendicular to the shoreline, as a direct path for water movement will not be created. Construction of roads perpendicular to the shoreline that would provide a path for the inland movement of water will be avoided, where possible. It is also noted that:

- The mining area is relatively narrow, typically a strip of about 80 m wide. Thus the overall impact of the mining operations will be comparatively minor;
- There will be a minimum buffer distance of 200 m from the beach areas to the mining areas (for turtle protection), and 50 m from inland water areas to mining areas; and

- The topsoil and vegetation stockpiles would be sited parallel to and on the seaward side of the pit, and will therefore provide some barrier to water movement.

Detailed procedures for rehabilitating disturbed areas will be described in the RMCP. The key matters in relation to potential storm surge events include minimising clearing, returning the land surface close to the original contour and undertaking rehabilitation works as soon as possible following mining.

Procedures have been developed for the evacuation of mine personnel and other persons in the mine area in the event of cyclone alerts. This will include accounting for all persons entering and leaving the area via the mine access road and for closure of the mine roads, and erection of appropriate warning signs during periods of potential storm surge. During cyclone alerts, mining activities would be suspended, and there will be no personnel in the beach and coastal dune areas.

Storm surge

Matilda commits to implementing evacuation procedures in the event of a cyclone to ensure employee safety.

Matilda commits to maintaining a 200 m buffer zone from mining activities to the Spring High Water Mark to mitigate impacts on sea turtle nesting behaviours on adjacent beaches. This will also reduce the risk of inundation of mining areas if a storm surge is experienced.

Matilda commits to minimising the area of land disturbed and to minimise the area of land that is cleared at any one time.

Matilda commits to progressively rehabilitating mined areas as soon as practically possible.

Surface water

The proposed Andranangoo mine site is part of the Andranangoo Creek catchment, which is an undeveloped tropical rural catchment (Figure 5). The creek extends approximately 45 km south of the site. The total area of disturbance to the catchment for the haul road, mine site and camp areas is approximately 65 ha (0.65 km^2) representing about 0.12% of the catchment. The volume of surface water flow in the catchment is estimated to be 242 GL per annum.

The mining activities are located predominantly within a natural drainage line north of an escarpment at an elevation of between approximately 2 to 4 m AHD. Drainage from the mining area will migrate westward towards wetlands/damp lands and tidal mangroves associated with Andranangoo Creek, which is approximately 500 m from the most eastern mineral sand deposit. A ridge of coastal dunes, at an elevation of about 4 to 5 m AHD, inhibits drainage northward towards the coast.

Directly south of the proposed mining area, a perennial spring flows into a low lying area (which is also within the proposed mining area), and then to an adjoining clay pan and estuary.

The Lethbridge mine site is part of the Aliu (Jessie) Creek catchment, which is also an undeveloped tropical rural catchment (Figure 5). The creek extends approximately 42 km south of the site. The total area of disturbance to the catchment for the haul road, mine site and camp areas is approximately 35 ha (0.35 km^2) representing about 0.07% of the catchment. The volume of surface water flow in the catchment is estimated to be 215 GL per annum. No springs are located at the Lethbridge sites.

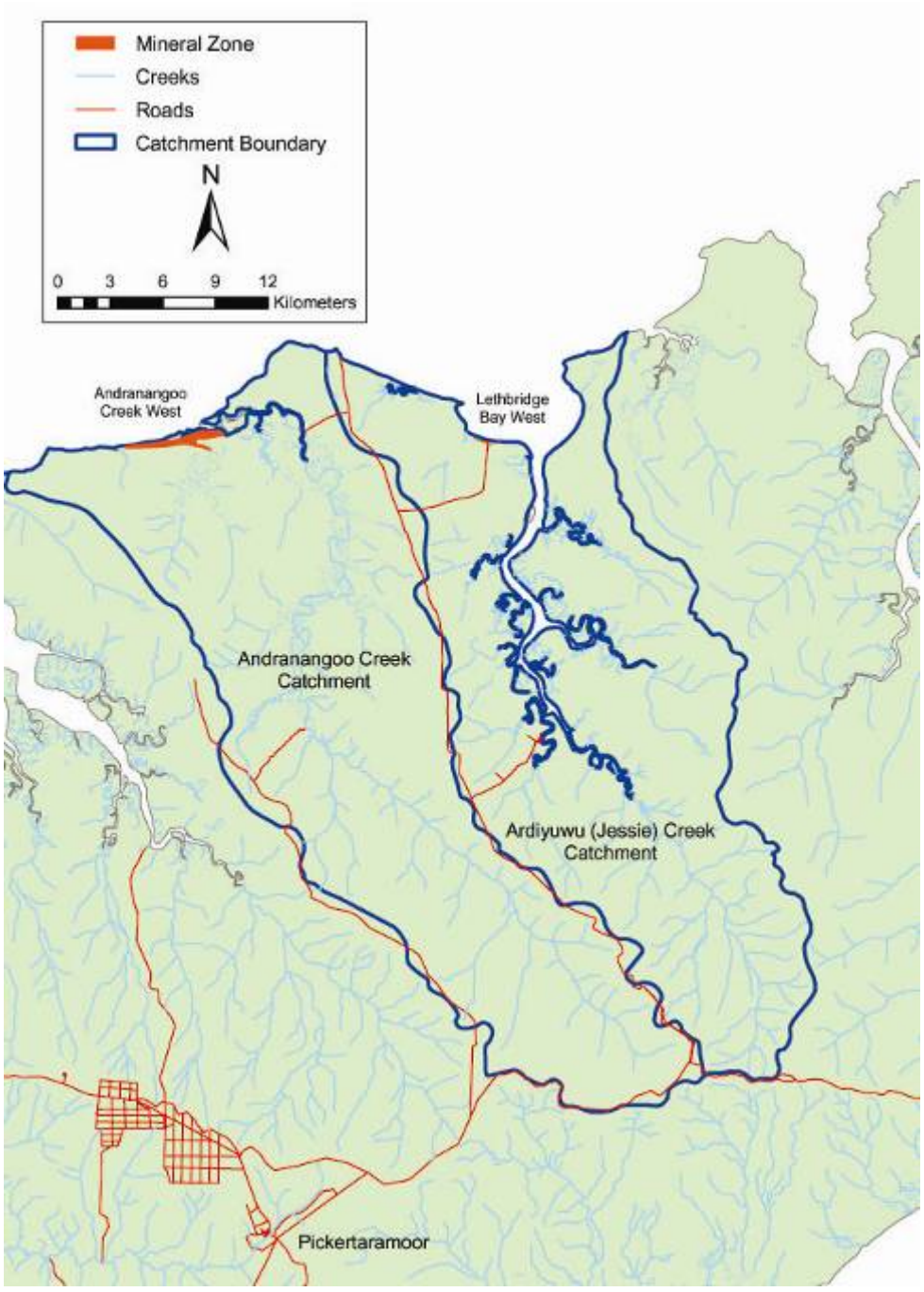

Figure 5: Catchment Areas

The mining activities are located on a level plateau at approximately 3 m AHD. The western and eastern portions of the deposits drain southwards towards wetlands/damp lands. The western portion of the Lethbridge deposit is 50 m north of wetlands/damplands and 50 m east of a small area of tidal mangroves.

The eastern boundary of the Lethbridge site is approximately 2.0 km west of Aliu Creek, and the northern boundary is approximately 0.5 km south of Lethbridge Bay. It is understood that both of these creek systems are used for fishing by existing fishing charter businesses and recreational fishermen.

The potential surface water issues and impacts expected from the activities at both the Andranangoo and Lethbridge sites include:

- Changes to landform in mining areas, which could alter site drainage;
- A small increase in the volume of surface water generated in each catchment, as a result of vegetation removal;
- Potential erosion in mining area, stockpile areas and along haul roads which could impact on nearby receiving environments;
- Potential drainage issues in the mining area and haul roads, which could have some localised impacts on nearby waterways; and
- Potential water quality impacts from deposition of eroded sediments into nearby waterways.

The predominant vegetation type in both prospect areas is *Melaleuca* woodland; these species could potentially be impacted by changes to the surface water regime. Coastal Vine Thicket, which also occurs at Lethbridge, is of conservation significance and is susceptible to changes in surface water dynamics.

In order to manage the impact associated with short-term changes to the landform:

- All earthworks will be managed so as to minimise disturbance to drainage channels and erosion;
- The mining slot will be backfilled and compacted with earthmoving machinery as soon as practicable after mining ceases, to provide a stable landform that is consistent with the pre-mining landform and is compatible with surface water drainage requirements prior to revegetation; and
- The backfilled landform will be progressively rehabilitated as soon as is practicable.

In order to manage potential impacts associated with sedimentation and erosion:

- A 50-m buffer zone will be maintained from mining activities to adjoining adjacent creek systems, wetlands/damplands and the mangroves, in order to minimise the deposition of sediments into these systems. A buffer zone from mining activities to the Spring High Water Mark of 200 m is proposed to mitigate impacts on sea turtle nesting behaviours on adjacent beaches. This will also reduce the risk of inundation of mining areas if a storm surge is experienced;
- Internal drainage will be constructed within the mining slot to collect run-off, prevent soil erosion and sediment transport outside the mining slot by tailings;
- To provide protection from run-off from the escarpment, a temporary bund and shallow spoon drain will be constructed on the escarpment side of the road to provide flood protection to the active mining area, and to divert flows around the active mining and rehabilitation areas;
- Spoon drains, pipe and culverts will be constructed to control surface water flow along haul roads as required; and
- Spoon drains and a low berm will be constructed around feeder stockpiles to minimise the transport of sediment.

Contamination issues will be managed by:

- Storing concentrate in bunded and roofed storage facilities both at Andranangoo and Lethbridge sites, and at Port Melville;
- Avoiding excavation into areas potentially containing ASS;
- Storing fuel in isotainer durable skinned facilities; and

- Implementing appropriate waste management plans.

Surface water

Matilda commits to implementing measures to minimise potential erosion from the mine sites, haul roads and camps.

Matilda commits to managing earthworks so as to minimise disturbance to drainage channels and erosion.

Matilda commits to continual rehabilitation of the disturbed areas and to minimising the total area of disturbance at any one time to reduce the amount of erosion from surface water flow and to monitor soil erosion.

Matilda commits to maintaining a 50 m buffer zone around the wetlands/damplands and mangroves to prevent erosion and to reduce deposition of sediment.

Matilda commits to monitoring surface water prior to commencement, during and following the completion of mining activities.

Groundwater

A groundwater drilling and testing program has been completed at the Andranangoo and Lethbridge deposits to elucidate the hydrogeology and install a network of groundwater monitoring and process supply bores. The groundwater monitoring network has been established to monitor the impacts of mining operations on groundwater resources.

The Andranangoo deposit is underlain by unconfined aquifers within the saturated Van Diemen Sandstone and superficial sediments on the coastal plain. Superficial sediments are limited in extent and thickness (generally less than 5 m) and usually coincide with the strand-line deposits. Groundwater quality is fresh.

The water demand for the project has been estimated. Based on 90% return water from the dewatering cyclone and a net loss of 360 kL/day from the tailings return water through seepage, the required bore groundwater supply is 840 kL/day. A camp water supply of 100 kL/day is also required. Detailed groundwater modelling has been undertaken to assess the potential impacts of this water demand.

The modelling predicts that the groundwater level drawdown associated with groundwater abstraction will reduce groundwater levels by up to 0.4 m at a distance of 100 m from production bores, and is limited at the coast (less than 0.1 m) where groundwater levels at the water table will remain above sea level, at 0.5 m RL. As a groundwater gradient towards the coast will still exist, and the groundwater elevation remains above sea level at the coast, seawater intrusion resulting from the simulated groundwater abstraction is unlikely.

In terms of localised impact in the spring area, a reduction of less than 0.1 m in groundwater levels under a perennial spring may result in a decrease in the depth and extent of the waterhole earlier in the dry season than would naturally occur. This effect will be short-term, during the period of mining, and will recover quickly following the cease of operations.

Similar to Andranangoo, aquifers occur at Lethbridge within superficial sediments on the coastal plain. The sediments are generally 5 m thick, underlain by the Van Diemen Sandstone. Groundwater on the coastal plain is brackish to saline (due to seawater intrusion) and fresh on the scarp. Process water requirements are similar to Andranangoo at 840 kL/day with a potable water supply requirement of 100 kL/day. A prospective location for process water supply is located on the scarp, south of the mining area. Groundwater level drawdown is predicted to be about 1 m at a distance of 50 m from the borefield.

At this stage preliminary modelling has been undertaken at Lethbridge, and more detailed modelling would be required to assess the impacts in more detail prior to mining, to determine the optimum location of the borefield. This modelling work would be undertaken following the proposed drilling program to be undertaken at the site. As groundwater levels are relatively deep on the scarp, impacts of reduced groundwater levels at the ground surface are not likely.

Groundwater

Matilda commits to monitoring of groundwater quality prior to commencement, during and following the completion of mining activities

Matilda commits to monitoring of groundwater levels fluctuations to assess any impacts of the borefield, especially in areas where a lowered water table could occur

Matilda commits to undertake further modelling at Lethbridge to assess the impacts in more detail prior to mining, to determine the optimum location of the borefield.

Flora

The Tiwi Islands are home to approximately 1068 native plant species, of which 11 taxa are endemic to the Islands. The Islands' flora also contains an unusually high number and proportion of listed threatened plant species, including 20 species that are listed as endangered or vulnerable, and a further 44 species regarded as data deficient.

As noted above, the habitats to be disturbed at Andranagoo are predominately *Melaleuca* woodland in the mining area, and *Eucalyptus* open woodland for the camp. At Lethbridge, the habitats to be disturbed for mining are also predominantly *Melaleuca* woodland, and *Eucalyptus* open woodland for the camp. In addition, the widening of the existing 4WD tracks from the main road across Melville Island to the mine sites is an additional disturbance, primarily to *Eucalyptus* woodland.

Plate 2 shows the habitat types found at Andranangoo.

Plate 2: Vegetation communities on coastal sand plain, Andranangoo

Matilda commissioned Kristen Metcalfe and Julie Crawford, Consultant Environmental Scientists, to undertake fauna surveys of the proposed sand mining sites and associated haul roads. The surveys focused on threatened species listed under relevant Territory (*Territory Parks and Wildlife Conservation* (*TPWC Act 2000*)) and Commonwealth (*Environment Protection and Biodiversity Conservation* (*EPBC Act 1999*)) legislation.

Of the 1068 native plant species recorded on the Tiwi Islands, a total of 165 plant species were recorded during the field surveys of the Lethbridge and Andranangoo sites. Of these, seven are endemic to the Northern Territory. One listed threatened species, *Cycas armstrongii*, was recorded at Andranangoo. This species is listed as Vulnerable under *TPWC Act 2000* but is not listed under the *EPBC Act 1999*. Only two exotic species (one naturalised) were recorded during the surveys at each of the mining prospects (Metcalfe 2005a).

It is noted that due to the below-average rainfall during the 2004/2005 wet season, not all annual species may have germinated, and so not all of the annuals usually present may have been recorded during the field surveys. In response Matilda intends to undertake further monitoring of areas of proposed disturbance over time.

The haul road surveys found no significant additions to the species recorded at the prospect areas. However, a search of a wetland approximately 500 m to the east of the Andranangoo haul road at km 55.2 resulted in observation of a number of *Lindernia* 'Melville Island' D28769. This species is only common on the Tiwi Islands, and although it is not endemic, it is rarely found elsewhere (Woinarski *et al*. 2003a). The proposed road alignment was amended to avoid this wetland, and the area should not be impacted by the construction and operation of the haul road (Metcalfe 2005b).

Similarly the Lethbridge haul road survey found no significant additions to the species recorded at the prospect areas. However, *Cycas armstrongii* was recorded in high numbers along the haul road. This species is recorded as being locally common along the haul road and it is anticipated that approximately 50-100 plants will be affected by the widening of the haul road. This number of cycads is considered relatively minor in the context in their population in the local area (Metcalfe and Crawford 2005).

A total of 17 weed species were recorded along the Andranangoo haul road with three additional exotic species associated with abandoned gardens in the Pickertaramoor area (rain tree, heliconia and bougainvillea). The weeds are concentrated in the Pickertaramoor area, and include heavy infestations of introduced species including three class B species: *Sida acuta*, *Sida cordifolia* and *Hyptis suaveolens*. Once the haul road leaves the existing alignment, it becomes remarkably weed free (Metcalfe 2005b). No weed species were recorded on the Lethbridge haul road (Metcalfe and Crawford 2005).

The proposed mining process is a relatively small-scale, closely contained operation that incorporates progressive rehabilitation of recently mined areas. The stockpiling and respreading of topsoil and brush cover will facilitate the revegetation of mined sites with the original species composition. Any direct seeding or planting of seedlings will utilise species found in the local area wherever possible, to ensure best rehabilitation success, and also to ensure that the flora provenance is preserved.

A vegetation monitoring program that includes a weed monitoring program will be implemented. The vegetation monitoring program will focus on pre- and post mining disturbance in order to provide a basis by which to compare results and measure the success of the rehabilitation methodologies.

In order to minimise the spread of weeds onto the Islands, improved quarantine infrastructure has been put in place at the Tiwi Barge Service, which has an inspection and wash-down facility to prevent such introduction on to the Islands. Matilda will work with the appropriate authorities and the Tiwi Barge Service to ensure that weed seed or plant material is not accidentally transported onto the Island. Matilda will also adhere to all quarantine regulations and legislation under the *Weeds Management Act 2001*, and will develop internal procedures to ensure that these quarantine requirements are met.

Flora

Matilda commits, where possible, to avoiding areas that have been found to contain species protected under the EPBC Act 1999 and TPWC Act 2000 and avoid vegetation communities considered as having conservation significance.

Matilda commits, where possible, to avoiding areas that are considered to be more susceptible to environmental degradation from erosion, changes in drainage, pollution and weed introduction.

Matilda commits to minimising the area of land disturbed and to minimise the area of land that is cleared at any point in time, and to progressively rehabilitate mined areas as soon as practicably possible.

Matilda commits to a pre- and post mining flora monitoring program which will encompass surveys to determine the species present and to establish the success of rehabilitation. Pre-mining surveys will include the identification of annuals in the proposed areas of disturbance.

Matilda commits to a weed monitoring and weed management plan to control the establishment and spread of weeds.

Matilda commits to abiding by the existing Tiwi Islands quarantine procedures and applying their own management programs to control and prevent the establishment weeds.

Fauna

Matilda commissioned Indicus Biological Consultants Pty Ltd to undertake fauna surveys of the proposed mineral sands mining sites and associated haul roads. A total of 132 species were recorded during

surveys of both prospects and both haul roads, comprising 12 mammals, 98 birds, 19 reptiles and three frog species.

Of the 132 species recorded during the survey, 22 are considered to be of conservation significance and are listed under government legislation. However the majority of the species (110) are thought of as common and widespread both on Melville and Bathurst Islands, and in northern Australia and mining activities are unlikely to have a significant impact on the overall population of any vertebrate species (Firth and Brady 2005).

The species that were recorded during the survey that are listed under the *EPBC Act 1999*, the *TPWC Act 2000* as well as the CAMBA, JAMBA and BONN convention include the Butler's dunnart, brush-tailed rabbit-rat, brush-tailed phascogale, masked owl, partridge pigeon, black-footed tree-rat and pale field-rat, ornate burrowing frog, northern bandy bandy, caspian tern, great egret, eastern reef egret, black-tailed godwit, common greenshank, white-bellied sea-eagle, osprey, rufous fantail, rainbow bee-eater, leaden flycatcher, restless flycatcher, olive ridley turtle and saltwater crocodile.

Of these species, the predominant issues of concern are the recording of the Butler's dunnart and the masked owl. Sea turtles are discussed separately below.

Two Butler's dunnarts (Plate 3) were trapped along the Lethbridge haul road (Firth and Brady 2005). Prior to mining at Lethbridge, Matilda will further survey the area where the Butler's dunnarts were found and investigate options for realigning the haul road over the next two years.

The masked owl was recorded in vegetation over both mineral deposits and along the Lethbridge haul road (Firth and Brady 2005). Matilda will regularly monitor the occurrence of masked owl over the life of operations as part of the fauna monitoring program.

Exotic (feral) animals have been accidentally or deliberately introduced into the Northern Territory and now inhabit much of the area of the Territory, including the Tiwi Islands. They cause profound natural resource degradation and ecological damage by consuming and depleting native flora and fauna, and out-competing native animals and spreading disease (DIPE 2004).

Introduced fauna species on the Islands have been identified as mammals (black rat, water buffalo, cattle, pig, horse, cat, dog), reptiles (gecko, flowerpot blind snake) (Woinarski *et al.* 2003b) and nine species of ants (Anderson *et al.* 2004). Of these, pigs, cats, cane toads and big-headed ants are considered as significant threats to natural resource values. Pigs have been introduced to Bathurst Island, and water buffalo to Melville Island, although there is more recent evidence of pigs on Melville (TLC 2004). Both pigs and water buffalo have previously been identified as hard to eradicate on the mainland (DIPE 2004).

Matilda will work with the appropriate authorities and the Tiwi Barge Service to ensure that exotic and feral fauna species are not accidentally transported onto the Island. In particular, this will focus on prevention of entry of feral ants and the cane toad.

Fauna

Matilda commits, where possible, to avoiding areas that have been found to contain species protected under the EPBC Act 1999, TPWC Act 2000, CAMBA, *JAMBA and the Bonn Convention.*

Matilda commits to further surveys of the Lethbridge Haul Road before the upgrade of the road takes place to confirm the population sizes and extent of the Butler's dunnart, which was recorded during the initial survey

Matilda commits to relocating any fauna species of conservation significance if found within the mine camp and mining areas.

Matilda commits, where possible, to avoiding vegetation communities considered as important habitats to these protected species.

Matilda commits to minimising the area of land disturbed and to minimise the area of land that is cleared at any point in time, and to progressively rehabilitate mined areas as soon as practicably possible.

Matilda commits to a pre- and post mining fauna monitoring program which will encompass surveys to determine the species present and to establish the success of rehabilitation.

Matilda commits to abiding by the existing Tiwi Islands quarantine procedures and applying their own management programs to prevent the introduction or establishment of feral animals onto the Islands, including cane toads and feral ants.

Plate 3: Butler's Dunnart (Lethbridge haul road)

Source: Firth and Brady, 2005

Sea turtles

Dr Michael Guinea of the School of Education Health and Science at Charles Darwin University was commissioned by Matilda to undertake sea turtle surveys of Andranangoo and Lethbridge. These surveys included an assessment of the distances travelled inland by turtles, recommendations to mitigate potential impacts upon sea turtle nesting behaviours and assessments of proposed vegetative buffer zones. A long-

term sea turtle monitoring program was also established and Matilda employees were trained to monitor and record sea turtle nesting activities on the beaches adjacent to the proposed operations.

Northern Australia is home to six species of the world's marine turtles and has globally significant nesting rookeries for four species (Kennett *et al*. 1997). These include flatback or greenback turtles, green turtles, hawksbill turtles, leather back turtles, loggerhead turtles and olive ridley turtles. All six species of sea turtles are listed as either vulnerable or endangered under the *EPBC Act 1999*. All occur in the waters of the Northern Territory, and each differs in the conservation status that is awarded under International, National and Northern Territory legislation (Guinea 2005a).

Surveys undertaken by Dr Guinea found that flatback and olive ridley sea turtles nest in low to medium densities on the beaches of Andranangoo Creek West and Lethbridge Bay West on Melville Island (Guinea 2005b). Collectively, 75 sea turtle nests were examined and all were within 10 m of the Spring High Water Mark (Guinea 2005b). Plate 4 shows flatback turtle tracks at Andranangoo.

Plate 4: Flatback Sea Turtle tracks at Andranangoo Creek West

Source: Guinea 2005

Nesting sea turtles are prone to disturbance by beach development in two major ways (Guinea 2005a).

1. Adult sea turtles, when approaching the beach to nest, are disturbed by the presence of lights on the beach. This may cause them to move to a nesting location away from the lighted beach. After laying their eggs the female turtle will be attracted to lights visible from the beach. This attraction can disorient the turtles and lead them inland where they become entangled in vegetation or die from exhaustion and dehydration.
2. Hatchling sea turtles, after they leave the nest, are attracted to lights visible from the beach. This disorientation leads to their death by dehydration and exhaustion and exposes the hatchlings to more predators.

A 200 m buffer zone is proposed to provide an adequate physical barrier between the proposed mining operations and the sea turtle nesting beach. Assessments of the effectiveness of this buffer zone indicated that tree density above the high water mark reached 1600 trees per hectare, providing a strong visual barrier between the beach and the mine site. The integrity of this 200 m buffer zone will need to be maintained and monitored during the mining operation (Guinea 2005b).

Additional controls to be employed by Matilda include:

- Limiting mining operations to day shift only. The only equipment that will operate during the night will be the feeder and a corresponding loader in the mining area, and the processing plant which is to be located on the escarpment;
- Restricting access to turtle nesting beaches to sea turtle monitoring activities only; and
- Designing lighting systems so as to minimise the potential for lighting impacts.

Noise has been identified as a potential issue that may impact on nesting turtle populations. Additionally other activities including human disturbance along the beach have also been identified as a potential issue that may affect the nesting turtles. However, it is very unlikely that noise will affect the nesting turtles as the make up of the turtles' ears differ to allow them to hear low frequency sounds whilst underwater, and very little sound above water (Guinea 2005b).

On-going monitoring of sea turtle nesting activities will be undertaken to demonstrate that the mining operation has no negative impact on the nesting sea turtles. Matilda personnel have been trained in the techniques of monitoring the beaches for evidence of sea turtle nesting and systematic recording of such nesting. Monthly reports will be compiled using a standard data sheet and a monthly data sheet. Additionally, any incident involving sea turtles will be reported on the Sea Turtle Accident, Injury & Incident data sheet (Guinea 2005b).

Annual reports on sea turtle monitoring programs will be supplied to the TLC, Office of Environment and Heritage, Department of Natural Resources, Environment and the Arts, and the Commonwealth Department of Environment and Heritage while Matilda are in the areas. Matilda will be at Andranagoo for three to three and a half years and at Lethbridge for approximately six months.

Sea Turtles

Matilda commits to providing a 200 m vegetative buffer zone from the spring high water mark specifically for protecting nesting sea turtles from potential effects of light spill and noise generation.

Matilda commits to conducting pit excavations in daylight hours to reduce the potential effect of light spill on nesting turtling populations.

Matilda is currently monitoring nesting sea turtle populations and commits to an on-going monitoring of sea turtle nesting activities during mining operations.

Matilda commits to restricting access by personnel to the nesting beaches except for sea turtle monitoring activities only.

Air quality

The current population of the Tiwi Islands is concentrated in the three main communities of Nguiu (Bathurst Island), Pirlangimpi (Melville Island) and Milikapiti (Melville Island). There are five

outstations: Wurankuwu, Paru, Taracumbi, Yimpinari and Takamprimili (TLC 2004). The closest community to the project areas is Milikapiti approximately 25 km and 40 km south west of Andranangoo and Lethbridge respectively.

Smoke pollution during the dry season is probably the single highest contributor to air pollution on the Tiwi Islands at present. The vegetation of the islands is burnt regularly to produce low intensity fires. Smoke pollution from these fires leads to an extensive haze that covers the Islands as well as releases of carbon monoxide (CO) into the atmosphere.

There is potential for dust emissions during the initial vegetation removal and operational mining phases, in particular during road transport. Activities that are likely to result in the generation of dust include:

- Haulage by road trains of the concentrate to the port facilities, and return.
- Excavation and loading of the ore and transportation of the ore via six-wheeled trucks along the mineralised zone back to the feeder.
- Transportation of personnel and materials to and from the mine site.

The proposed mining locations are remote and there are no residents in close proximity to the site, which will reduce the impact on surrounding human populations. The wind direction is predominantly north-westerly in the wet season, and south-easterly in the dry season; this wind direction will blow particles either offshore away from populated areas in the dry season or inland east of the major populated areas.

Dust emissions will be kept to a minimum as:

- Clearing will be minimised and areas will be progressively rehabilitated.
- The sand is relatively coarse and will produce minimal dust.
- The sand as it is mined will be damp (4-5% moisture).
- The proposed mineral sand processing methodology is a wet process.
- Concentrate will be stored in roofed storage sheds at both the mine site and the port.
- Haul roads will be maintained to ensure their suitability for use and will be regularly watered from water bores along the haul road.

If dust does become an issue at any time, Matilda will initiate appropriate dust suppression measures.

Air Quality

Matilda commits to progressive rehabilitation to stabilise the soils and to promote re-vegetation to minimise the effects of wind erosion and dust generation.

Matilda commits to decreasing greenhouse gas emissions through the efficient use of resources.

Matilda commits to minimising the area of land cleared at any point in time to reduce the amount of CO_2 released into the atmosphere.

Matilda commits to watering down roads to reduce the amount of dust emissions.

Matilda commits to further suppression measures if dust becomes an issue.

Noise

Due to the remoteness of the location of the mineral sands mining operations, it is not anticipated that noise will be a significant issue for the communities on the Tiwi Islands.

It is anticipated that the main sources of noise will be:

- The operation of generators to provide power to the mining operations and the camp;
- The operation of the processing plant;
- Truck haulage of concentrate from the minesite to the port, and return; and
- Loading of concentrate onto ships at the Port.

Matilda anticipates that an increase in noise levels to the local area will be experienced and local disturbance will occur over a temporary period (while the mine is operating) to some local wildlife through elevated noise levels. However, all efforts will be made to reduce levels where practicable.

Haulage of the concentrate will be a 24-hour operation, with four return trips from the mining areas to the port anticipated every 24 hours. This will result in an increase to the existing noise levels on the road between the port and the proposed mining operations, however this is not considered to be significant due to the remoteness of the operations.

Loading of concentrate onto ships at the Port will also result in an increase in noise emissions when loading occurs. Front-end loaders will fill bins on trucks; these are then emptied from the side of the port by the ships gantry. This is not a high noise activity.

All equipment used during mine operations and haulage will be fitted with efficient silencers, in accordance to the *Motor Vehicles Act 1949*. Additionally power supply generators will be silenced and located away from camp areas.

Matilda proposes to restrict the operation of mining equipment to daylight hours. The only equipment that will operate during the night will be the processing plant, which is located on the escarpment, and the feeder and a corresponding loader in the mining area.

All cabins will be closed and air conditioned to reduce the effects of noise on employees. Employees will be allocated earmuff/plugs where required, to further reduce the effects.

Any noise generated by the plant or camp at night will be further abated by the strong onshore winds that are experienced at night along the northern beaches of Melville Island (Guinea 2005b).

Noise

Matilda commits to providing a 200 m vegetative buffer zone from the beach areas to further reduce the effect of noise on nesting turtles

Matilda commits to reducing noise emissions where possible.

Radiation

The uranium and thorium levels of the mineral sands at the deposits are very low, compared with most mineral sands deposits elsewhere in Australia. Assays of concentrate have given levels for uranium of 160-217 ppm, and for thorium of 135-195 ppm (Matilda pers. comm. 2005).

Based on these uranium and thorium assays, the mineral sands would not be regarded as 'Radioactive Ores' as defined by the Code of Practice on Radiation Protection in the Mining and Milling of Radioactive Ores (1987).

Matilda has been advised that there is no requirement to obtain approval from the Commonwealth to export the mineral sands concentrate from Andranangoo or Lethbridge, as in 1997 the government removed export controls from rutile and zircon concentrates (Barton pers. comm. 2005).

Matilda has also been advised by WorkSafe NT that licensing is not required under the Northern Territory *Radioactive Ores and Concentrates (Packaging and Transport) Act 2002.*

However advice from the Northern Territory Department of Health and Community Services (DHCS) indicates that Matilda will need to apply for a licence to possess sell and handle radioactive material and appoint a Safety Officer under the *Radiation (Safety Control Act) 1999.* The conditions of this licence are likely to include a requirement for operations to be conducted in accordance with the Code of Practice for the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005).

A radon and gamma survey was conducted on the 12th and 13th of October 2005 at Andranangoo by John Waters of On Site Technology Pty Ltd (On Site) at Andranangoo, to:

- establish pre-operational baseline radon measurements to compare against post-operational rehabilitation measurements; and
- facilitate the estimation of probable occupational exposure during the mining and transport of minerals and the disposal of waste materials.

This survey program included training Matilda staff to implement the atmospheric radon and gamma dose monitoring program over time.

Samples were taken in costeans within the mineralised zones, on the soil surface adjacent to the costeans within the mineralised zones, and on the Quaternary strand plain and on the tertiary plateau.

No statistically significant difference was found between the radon flux in the costeans, the surface soil adjacent to the costeans or the Quaternary strand plain, however there was a statistically significant difference between the locations on the tertiary plateau and all other locations. The dominant regional source of radon was found to be the tertiary plateau, rather than the area of mineralisation. It is therefore concluded that the proposed mining operation at Andranangoo will not significantly impact on regional or local atmospheric radon levels (Waters 2005).

The estimated annual gamma dose rates [(0.70 mSv per year (95% upper confidence limit 0.96 mSv per year)] are comparable with normal background radiation exposure in the Australian environment. For example typical backgrounds in Adelaide vary from 0.80 to 1.3 mSv per year. Typical backgrounds in Darwin based on measurements taken on 14th October 2005 range from 0.50 to 1.0 mSv per year.

Under these conditions, exposure of employees and members of the public to radon and radon daughters from current operations and proposed mining activity will not be higher than natural exposure in the region (Waters 2005).

Matilda has developed a Draft Environmental Radiation Management Plan and has commissioned Western Radiation Services to prepare a more detailed Radiation Management Plan prior to commencement of operations. This plan will meet the requirements of any licence conditions associated with the *Radiation (Safety Control Act) 1999* and where required it will also comply with the Code of Practice for the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005).

Matilda will monitor soil radon flux and gamma levels at Andranangoo 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 to continue the monitoring program based on the data gathered. The monitoring program would be implemented for the entire production period at Lethbridge, which is expected to be six months.

Radiation

Matilda will develop a Radiation Management Plan that meets the requirements of the Radiation (Safety Control Act) 1999 and appoint a Radiation Safety Officer.

Matilda commits to and trained staff to undertake a long term gamma and radon monitoring program in order to ensure that doses are kept below harmful limits and to ascertain baseline data.

Fire

Fire has been used by aboriginal people for tens of thousands of years and has become an integral part of the ecological fabric of the Top End landscape (Williams *et al.* 2002). Burning is an important land management tool for Tiwi residents for both historical and contemporary reasons (TLC 2004).

Woinarski *et al.* (2003c) summarised the recent fire history (1993-1999) on the Tiwi Islands as being concentrated along the roads and in more frequently visited areas. It is also noted from a review of the fire history that large areas of western Melville and central Bathurst are burnt almost every year, while the less accessible eastern area of Melville is burnt less frequently.

Matilda will work with the TLC and the local land owners to adopt a local fire management plan to prevent the spread of wild fires into or out of the camp and processing areas. Matilda will utilise fire management practices already in use on Melville and work in conjunction with the TILG to develop a fire management strategy.

Fire breaks will be maintained around the perimeter of the camp and processing areas. Fire breaks will consist of a 15 m vegetation free corridor surrounding the camp and processing areas. Fire breaks will be maintained on a six month basis and will be cleared by front-end loader and grader.

A ‘no fire’ policy will be adopted (with the exception of waste burning) in the camp and processing area to reduce the risk of accidental fire to the camp, processing area and surrounding areas. In case of fire in the camp or processing area the OH&S and emergency response procedures will be followed.

Fire

Matilda commits to working with the TLC and the local land owners to adopt a local fire management plan to prevent the spread of wild fires into or out of the camp and processing areas.

Matilda commits to a ‘no unauthorised fire’ policy within the mine and camp areas.

Matilda commits to maintaining firebreaks on a half yearly basis.

Matilda commits to avoiding areas infected with weeds to prevent weed spread that will alter fire regimes.

Hydrocarbons and hazardous substances

The proposed method of separating the heavy minerals from the mined sands is a chemical-free process. Therefore there are no large quantities of chemicals required to be shipped, trucked and stored by Matilda at any one time. Chemical usage will be limited to those used for domestic cleaning and hygienic purposes in the camp. All chemicals will be shipped to the island via the Tiwi Barge Service. Chemicals will be trucked from the port to camp along the haul road.

Hydrocarbons, such as fuels and oils, will be used to run generators, for mobile plant, and for camp facilities. Existing fuel storage facilities are located at PenSyl facilities at Port Melville as well as Sylvatech's workshops at Maxwell Creek. Matilda proposes to use these facilities as required for storage of fuels, and servicing and fuelling of haul trucks.

Additionally there will be a bulk fuel storage facility located at the proposed mine sites, which will utilise isotainers of capacity 26 kL. The isotainers would comprise a fuel storage tank contained within a sealed isotainer, which would provide secondary containment. These facilities will supply all fuel requirements for mining, processing, power supply and light vehicles. Fuels will be supplied by Australian Fuel Distributors (AFD).

The total fuel usage is estimated to be 3,099 kL per annum. The average fuel usage is estimated to be equivalent to 2.3 fuel isotainers per week. It is anticipated that a maximum of five fuel isotainers (130 kL of fuel), sufficient for approximately two weeks operation, will be stored at the mine site at any one time.

All hazardous and dangerous goods will be handled and stored according to the information provided on the Material Safety Data Sheets (MSDS), 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).

The proposed placement of hydrocarbon storage facilities on the escarpment has been decided by considering potential events that could lead to a spill, with consequent soil contamination. The placement on the escarpment will minimise the risk of soil contamination in the event of a spill, as the mining areas are characterised by sandier (more porous) soils. In addition the placement on the escarpment will also minimise the risk of spill and also inundation arising from storm surge events.

Appropriate bunded storage areas for dangerous goods and for refuelling will be provided. Lubricating oils and greases for vehicles and generators will be stored under cover, in drums in a bunded dangerous goods area, as per Matilda's Hydrocarbon Management Guidelines. Any minor quantities of chemicals would also be stored in this area. The fuel and chemical storage and handling facilities will be inspected on a regular basis, and maintained to ensure compliance with Australian Standards.

Matilda personnel will have access to safety equipment required for the correct handling of hazardous goods, and also access to strategically placed spill stations equipped with the necessary equipment for clean up of any spills. Matilda has procedures for clean-up and reporting, in the event of a spill. Any spills will be cleaned up immediately. Contaminated runoff and contaminated soil will be collected and remediated on site, or transported to a suitable facility for disposal on the mainland.

A close-out procedure is used in the event of spills, to assess whether any change to procedures, equipment or responsibility is required, to minimise the future likelihood of recurrence of events.

Hydrocarbon and Hazardous Substances

Matilda commits to storing and handling flammable and combustible liquids, and corrosive substances as per the relevant Australian Standards (AS 1940 – 1993 and AS 3780 – 1994).

Matilda commits to maintaining an inventory of all receivables and dispatches of hydrocarbon and chemical products, including supplier, quantities, types and storage location of hydrocarbons, chemical products and associated products.

Matilda commits to storing hydrocarbons and hazardous substances in appropriate bunded storage areas, or, in the case of bulk fuel, in double-skinned isotainers.

Matilda commits to storing and transporting hydrocarbons and hazardous substances as per the recommendations made on the material safety data sheets.

Waste management

In recognition of the unique environment in which it operates, Matilda aims to promote best practice in the minimisation of generation of waste; to dispose appropriate wastes on site through appropriate maintenance of waste disposal areas; and to dispose other wastes off site through the utilisation of environmentally responsible waste disposal companies.

Non-hazardous waste such as building materials and fill will be generated from construction. Hazardous waste including hydrocarbons and other chemicals such as solvents, paints and cleaning products may be produced during construction and operation. Oily waste will be produced from generators and vehicles, oily rags, oil filters and other disposable parts. Domestic wastes and sewage will be produced by staff and contractors. Sand tailings will be produced by the minerals separation process.

Matilda has developed a Draft EMP to address waste management issues to ensure that it minimises and mitigates potential environmental impacts associated with the generation of waste from proposed operations.

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 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 will produce approximately 7,000 L of waste oil a year.

Any chemical waste (very minor quantities) would also be collected in a 205 L drum identified as chemical waste. It is proposed that these wastes would be taken to Port Melville for collection by a waste recycling and disposal contractor (Drum Muster).

Miscellaneous vehicle waste (tyres, batteries, scrap parts) would be collected for return to Darwin for appropriate recycling and / or disposal.

Domestic type waste arising from the camp (including kitchen and office waste) would 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 would be dug with a backhoe, and covered with earth following burning to discourage bird and animal access. Upon completion of mining the disposal trench area would be covered and surface turned to encourage revegetation.

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 it becoming a mosquito breeding ground.

Waste Management

Matilda commits to reducing waste production through the efficient utilisation of resources.

Matilda commits to disposing of appropriate wastes on-site through appropriate maintenance of waste disposal areas and disposing of other wastes off-site through the utilisation of environmentally responsible waste disposal companies.

Biting insects

Matilda commissioned the Medical Entomology Branch, Department of Heath and Community Services (DH&CS) Northern Territory Government to undertake fauna surveys of the proposed mineral sands mining sites and associated haul roads. Investigations included surveys of the surrounding environment to identify possible sources of biting insects, assessment of the potential for the creation of new mosquito breeding sites as a result of mining activities, establishment of baseline data, and the training of Matilda staff to establish a mosquito monitoring program.

The DH&CS trained Matilda staff to collect specimens from the traps and follow up trapping will be conducted by Matilda and the contents shipped to DH&CS for analysis. Trapping will be conducted on another three occasions.

DH&CS also provided guidance on how to prevent mining activities from creating new mosquito breeding sites and information on how to reduce biting insect populations and prevent mosquito borne disease transmission at the development sites.

In the initial survey DH&CS identified that possible nuisance, and possibly minor to moderate pest problems, will be caused by the mangrove biting midges *Culicoides ornatus* and *Lasiohelia sp.* at both Andranangoo and Lethbridge. Mosquitoes *Ochlerotatus vigilax, Cx. Annulirostri, Anopheles farauti s.l., Culex sitiens, Verrallina funerea, Coquillettidia xanthogaster, Anopheles bancrofti and Mansonia uniformis* were also identified as being possible pest problems in and around mangrove creeks, *Melaleuca* woodland, tidal swamps and creeks.

Ochlerotatus vigilax, Verrallina funerea and *Culex annulirostris* will pose a considerable risk for Ross River Virus (RRV) and Barmah Forest virus (BFV) transmission at both prospect sites. *Culex annulirostris* will also pose a potential risk for Kunjin virus and Murray Valley encephalitis transmission at both prospect areas. *Culex sitiens* will pose a potential RRV transmission risk when numbers are elevated (Warchot 2005).

Anopheles farauti s.l., will pose a high risk of potential malaria transmission at both prospect areas in at least the months of March to June, with a potential risk of malaria transmission likely to occur for extended periods of the year at both prospect sites. The risk of potential malaria transmission will occur if a person infected with malaria is exposed to mosquito bites from this species (Warchot 2005).

Development activities have the potential to create new mosquito breeding sites, especially in those areas where mining will occur adjacent to swamps and drainage lines (Warchot 2005). The development will not impact on any biting midge breeding sites and it is possible that nuisance, and possibly minor to moderate pest problems, will be caused by the mangrove biting midge (Warchot 2005).

The camp facilities will be located in the upland eucalypt vegetation away from the mangrove creeks, *Melaleuca* woodland, tidal swamps and creeks. Employees will be advised to avoid going outdoors after sundown to avoid times when numbers will be high. Insect repellent and insect sprays will be provided to employees.

All plant machinery and accommodation will be air-conditioned to allow employees to isolate themselves from the possible high numbers of mosquito and midge populations during operational hours. Accommodation block windows will be fitted with fly screens to keep mosquitoes out.

If there are proven to be biting midge pest problems at either of the prospect areas, the work force and visitors would be warned of the potential problem and be advised on personal protection measures. Insecticide control of larval biting midges will not be necessary or warranted but if necessary, the reduction of adult biting midge numbers in the development site can be achieved by using bifenthrin barrier treatments (Warchot 2005).

Matilda employees will be tested for malaria before going on-site and annually.

Biting Insects

Matilda commits to working with DH&CS to continue biting insect trapping to gather baseline data.

Matilda commits to reducing the possible biting insect breeding locations by employing a continuous rehabilitation program and ensuring watered areas are inspected regularly.

Matilda commits to preventing the introduction of malaria onto the island by ensuring employees undergo malaria tests annually or when they return from overseas.

Socio-economic aspects

The Project area is located in a relatively isolated part of Melville Island, with the closest community being Milikapiti. Milikapiti is approximately 25 km by line of sight or 105 km by road from Andranangoo, and 40 km by line of sight or 120 km by road from Lethbridge. When the mineral sands mine and concentrator facility is fully operational it will be staffed by 8 to 15 employees, operating on a two weeks on / one week off roster.

Although the Project is in an isolated location and small in size, there are a number of potential socio-economic impacts, and these will need to be managed to ensure positive outcomes. Preservation of the natural environment, continued access to recreational areas and opportunities to improve the local economy have been cited during the consultations as areas of priority to the Tiwi people.

The Northern Territory economy will benefit from royalties paid by Matilda which are based on 18% of net profit which will equate to approximately $1,000,000 per year at current commodity prices and exchange rates. Five per cent of gross revenue will be paid to the TLC, who will distribute it to the landowners. This equates to approximately $900,000 per year at current commodity prices and exchange rates.

Matilda plans to develop a local employment strategy. Matilda is currently casually employing two Indigenous people in its field operations and hopes to be able to utilise further local employment during the construction, commissioning and operational phases of the Project. The company has commenced dialogue with the Tiwi Island Training and Employment Board (TITEB) and any training requirements Matilda needs will be met through TITEB.

A 15-person camp will be built on site. Employees will operate on a working roster of two weeks on followed by one week off. This sort of roster is not conducive to a settled family life for many people, and the Tiwi people may prefer to engage in contract work opportunities. Two areas of opportunity that exist for contract work are in mine site rehabilitation and civil works (road maintenance). The civil works crew is run by the TILG and has completed work for Matilda during the exploration phase of the Project. Matilda will investigate alternative rosters which will be more satisfactory for employing local Tiwi people.

Matilda proposes to transport the mineral sands to Port Melville for shipping. The average haulage will be four truck loads per day, six days a week, depending on rain. There will be no haulage when it rains, and extra trucking may be required following rainfall events. Matilda will ensure that all roads are maintained and that traffic activities do not adversely impact on the social surroundings. The potential transport-related issues include:

- Disturbance of amenity in relation to noise and vibration;
- Creation of dust;
- Increased traffic between the mine site and Port Melville;
- Potential for spillage of mineral sands; and
- Potential for an accident resulting in injury or fatality.

Matilda intends to develop a road transport strategy in collaboration with the TLC, with the aim of minimising the level of disturbance to the public from haulage operations and ensuring that safety is the number one priority.

The TLC and community have expressed a desire for accommodation infrastructure to remain after the mining project has ceased operations. This infrastructure could then be used for tourism, research or camping facilities. Matilda's current plans are to remove all plant and equipment post mining, and to leave the accommodation units at the last site they mine on Melville Island (currently Lethbridge). The mining area and other cleared areas will be rehabilitated. The camp area at Andranangoo could also be left if the local land owners wished, otherwise it would be rehabilitated. The community has indicated that they would like the haul roads and water bores to remain.

Socio-economic

Matilda commits to ensuring that adverse impacts are minimised and mitigated, and the short and long-term social enhancement opportunities on the island are maximised through the development of a consultation strategy.

Matilda commits to working with the TLC and the community to assess demand for employment and desired working conditions for future employment of locals through the development of an employment strategy.

Matilda commits to developing a road transport strategy reduce the level of disturbance and ensure safety is the number one priority.

Matilda commits to implementing cultural awareness programs for employees and sub-contractors.

Matilda commits to consultations with the TLC and the local community to establish agreed end land use of areas and infrastructure requirements.

Matilda commits to developing a monitoring and evaluation program for reporting to government and non-government stakeholders on the social impacts of this Project.

Historic and cultural heritage values

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 Project areas are located in the traditional lands of the Tiwi Aboriginal people and more specifically within the area of the Yimpinari group.

The first evidence of foreigners coming to the Tiwi Islands was perhaps in the early 1600s when the Macassans sailed from the Indonesian Island of Sulawesi in search of the sea cucumber (Trepang) (Alford 2005). The first written account of the sighting of the Tiwi Islands was made by Dutch navigator, Pieter Pieterszoon, on 13 June 1636, who was exploring to confirm whether any connection existed between New Guinea and the 'southland'. It was the British who on 21 May 1818 named the Bathurst and Melville Islands, and six years later on 23 September 1824 Fort Dundas was established on Melville Island. (Alford 2005).

The Tiwi Islands were declared an Aboriginal Reserve in 1941, and on 7 September 1978 title deeds for their land were handed back to the Tiwi people by the then Minister for Aboriginal Affairs, Ian Viner (TLC 2004). The Tiwi people have a land council, local government and traditional groups the last of which is also responsible for ceremony and care of country (TLC 2004). Access to the islands is provided under approval of the TLC and is authorised through the issuing of permits under the provisions of the *Northern Territory Aboriginal Act 1980*.

The Project area and surrounds contain a number of specific values with respect to the Tiwi people. The Tiwi people regularly go on camping trips and enjoy hunting buffalo, geese and occasionally crocodile, around the proposed mine site areas. The area is also accessed by boat for fishing and hunting of dugong. Evidence from stakeholder consultation suggests that the Milikapiti community is the most active Tiwi Islands community in camping and hunting. The Andranangoo and Lethbridge sites and their surrounding areas are often utilised by the Tiwi people for recreational pursuits. The most popular hunting grounds adjacent to the Project area are near Lethbridge East, next to the saltwater lakes.

Aboriginal archaeology

An archaeological survey at Lethbridge and Andranangoo was completed by Christine Crassweller, of Begnaze Pty Ltd (Begnaze), on 20 and 21 January 2005. No Aboriginal archaeological sites were located at either Lethbridge or Andranangoo during the field survey. One small background scatter of shells was discovered at Lethbridge and was assessed as having being deposited by humans as a food resource in the past, and of low archaeological significance. This site is located on the margins of the Lethbridge site and is likely to be disturbed by the Project (Crassweller 2005). A permit to disturb will be requested from the Heritage Conservation Services of the Department of Natural Resources, Environment and the Arts as per the requirements of the Heritage Conservation Act 1991.

The TLC has undertaken consultations with Traditional Owners on behalf of the Aboriginal Areas Protection Authority. These consultations indicated that an old grave site is known within the vicinity of Andranangoo Creek although the exact location was not known. A search for a grave site by the TLC and Traditional Owners was unsuccessful however, the consensus was that the grave site is on high ground, and not in the area that Matilda plans to mine.

The TLC have recommended that the conditions of the Authority Certificate should ensure that if evidence of a burial site is discovered during operations, operations would cease immediately in that area and the TLC be notified as soon as possible.

Matilda intends to put into place procedures for managing discoveries of grave sites or subsurface archaeological material during operations. In the event that such material or sites are found, work would immediately cease in the area and the TLC and Traditional Owners should be informed. Advice would also be obtained from Heritage Conservation Services to ensure the conditions of the *NT Heritage Conservation Act 1991* are not contravened.

European archaeology

A field survey to determine the existence of any European cultural sites was carried out on 20 and 21 January 2005 by Bob Alford, Heritage Consultant. This did not reveal any items of European cultural material that would be of heritage significance.

Although there has been European association with the Tiwi Islands since 1636, the short-lived nature of these activities in the Project areas has meant very little if any remaining European material could have survived. Reference to a number of historical records failed to confirm the presence of European occupation on the northern extremities of Melville Island east of Snake Bay. In addition, a search of the National Archives database found there to be no sites relevant to the project. There are no historic European occupation sites or European cultural heritage sites located within the defined boundaries of the Lethbridge or Andranangoo minesites and their associated infrastructure areas (Alford 2005).

Historical and Cultural Values

Matilda commits to protecting the historic and cultural values by ensuring they are advised of the existence and location of any sites.

Matilda commits to developing procedures to be undertaken if historic artefacts or site and cultural heritage site are located during operations, which would include notifying the TLC and the Traditional Owners and obtaining any relevant permits to disturb from Heritage Conservation Services.

Rehabilitation and mine closure

Matilda will manage rehabilitation requirements through the development and implementation of specific rehabilitation objectives, development of rehabilitation methodologies and procedures, undertaking rehabilitation research, monitoring, reporting and contingency planning.

Rehabilitation objectives will be based upon predefined specific closure criteria that take into account:

- Legal and other statutory requirements;
- Stakeholders' interest;
- Post-operation closure requirements; and
- Relinquishment signoff.

These rehabilitation and closure criteria will be developed in agreement with the TLC and the Traditional Owners of the areas to be mined.

Matilda recognises that there are a number of constraints that may potentially affect the success or otherwise of rehabilitation in coastal areas. Matilda will trial and monitor the effectiveness of these methods over time against pre-defined completion criteria. Should these methods not prove adequate, corrective measures would be developed based on reviews of available rehabilitation research and, where necessary, rehabilitation trials may be undertaken.

An RMCP will be developed in consultation with the Landowners, TLC and DPIFM, prior to commencement of mining activities, with due consideration to post mining land uses and community expectations. The plan will incorporate rehabilitation objectives and completion criteria and reference specific rehabilitation, closure and relinquishment procedures, as appropriate. 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.

Matilda's RMCP will be consistent with the DPIFM Close Out Criteria – Life of Mine Planning Objectives (DPIFM formerly DBIRD, 2001), and also the ANZMEC / MCA Framework for Mine Closure (Commonwealth of Australia 2000). These criteria will be combined with the more specific criteria to be documented in the MMP as a result of the consultation process and will form the basis of the Matilda's RMCP for operations proposed to be undertaken on the Tiwi Islands.

In particular extensive consultation was undertaken with the local community and the TLC in the early planning stages, prior to submitting applications to explore the proposed mining areas. Matilda will continue to consult with these key stakeholder groups in relation to rehabilitation and mine closure, as well as other aspects of proposed operations, as appropriate over the life of the mining operations, to ensure that closure objectives and criteria reflect community expectations.

Final site relinquishment will require sign-off from the Traditional Owners, NT Government and the Tiwi Land Council. Matilda will work with these groups and organisations over the life of the proposed operations to ensure that rehabilitation and closure criteria meet the requirements of these groups to facilitate site relinquishment in an equitable manner.

Following annual assessment an incremental budget allocation will be made to the balance sheet, as part of Matilda's operating expenditure for site rehabilitation and mine closure purposes. These allocations will accumulate in the balance sheet over time. The funds will be sufficient to restore the mine site to the agreed closure and rehabilitation criteria. Rehabilitation and closure costs will be calculated based on the requirements of the RMCP. Expenditure will be authorised only by the responsible officer and will be utilised in accordance with long-term rehabilitation goals.

In order to commence mining operations in the Northern Territory, companies must demonstrate to the Northern Territory Government that they have adequate Securities to provide for rehabilitation and decommissioning in the event of project failure. Under the requirements of the *Mining Management Act 2001*, Matilda will review securities 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.

Currently Matilda has lodged securities with DPIFM in the form of a Bank Guarantee for exploration activities undertaken to date on the Tiwi Islands. Existing securities will be adjusted to take into account proposed mineral sands mining activities. The calculations of securities will be based on the detailed plans that will be specified in the RMCP and documented in the annual MMP.

Rehabilitation and Mine Closure

Matilda commits to consultations with the TLC and the local community to establish agreed end land use of areas and infrastructure requirements.

Matilda commits to developing a Rehabilitation and Mine Closure plan that documents requirements and agreements in relation to rehabilitation and mine closure. This document will be consistent with the DPIFM rehabilitation and closure requirements, will be reviewed on an annual basis and will include security calculations.

Matilda commits to minimising the area of land disturbed and to minimise the area of land that is cleared at any point in time, and to progressively rehabilitate mined areas as soon as practicably possible.

Matilda commits to restoring disturbed areas back to the original landform contours where possible. Where this is not possible reshaped contours will be compatible with the surrounding landform.

Matilda commits to stabilising disturbed areas as soon as practically possible to prevent wind and water erosion.

Matilda commits to revegetating the disturbed land 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.

Matilda commits to a developing a rehabilitation monitoring program that includes assessments of landform stability, flora and fauna in the rehabilitated areas.

Matilda commits to ensuring that closure requirements are progressed and achieved, as required after mining operations have ceased and to implement contingency plans if required.

Matilda commits to allocating money to a nominated account every six months, as to budget for operating expenditure for site rehabilitation and mine closure purposes.

Stakeholder consultation

Matilda has undertaken extensive consultations with the TLC, Traditional Owners and Northern Territory government since beginning exploration in 2004 in recognition of the importance of community consultation and support to the viability of the proposed project.

Prior to preparing the EIS, Matilda identified and consulted with the following stakeholders:

- Tiwi Land Council
- Traditional Owners
- Tiwi Island Local Government
- The Tiwi Union
- Office of Environment and Heritage
- Minister for Environment
- Minister for Mines
- Tiwi Islands Training and Employment Board.

During the preparation of the EIS, consultation was undertaken with a wider range of stakeholders. These included a number of Government departments, NGOs and local businesses.

The consultation has provided an opportunity for the issues raised to be addressed in the EIS and in turn to inform the design and management of the Project. The main issues identified during the consultation program included:

- The potential difficulty in successfully rehabilitating the land after mining;
- Employment prospects for the Tiwi Islanders;
- Continued access by the Tiwi Islanders to land for recreational purposes;
- Mine closure agreements relating to rehabilitation and infrastructure, which need to be crystallised prior to the commencement of mining;
- The importance of full information being provided to the community and on-going consultation undertaken;
- Potential for fresh groundwater to become saline during mining; and
- The potential for ASS and radioactive material issues to arise.

Each of these issues has been addressed in the proponent's response to issues within the consultation chapter of the Draft EIS and throughout the Draft EIS document itself.

The Draft EIS is subject to a public review period of not less than 28 days. During this time, the Proposal will undergo further scrutiny by regulators and the community. Matilda Minerals will maintain its existing stakeholder consultation by continuing its consultation program during the public review period.

In the event the Project receives environmental approval and is implemented, Matilda intends to continue the consultation process throughout the construction, operation and decommissioning phases. A consultation strategy will be developed by Matilda in collaboration with the TLC and Traditional Owners to ensure the delivery of current project information occurs in a timely manner, and in a way which is appropriate for the stakeholders. Included in the consultation strategy will be a mechanism for gathering grievances and bringing them to Matilda's attention so that they can be resolved.

Matilda's consultations with the TLC and Traditional Owners to date will form the foundation for a healthy working relationship.

Consultations

Matilda commits to maintaining its existing stakeholder consultation by continuing its extensive consultation program during the public review period and throughout the construction, operation and decommissioning phases of the mining operations, and developing a consultation strategy in collaboration with the TLC and the Traditional Owners.

Environmental management system

Matilda has developed a Draft EMS to assist them in managing their environmental responsibilities and to allow for continuous improvement of their environmental management programs. The EMS will enable Matilda to systematically identify environmental impacts and obligations, and their significance. EMPs will address these impacts and obligations, and include targets which enable Matilda to measure their environmental performance.

The Draft EMS has been developed in accordance with the Draft EIS Guidelines for environmental assessment purposes; the working EMS will continue to be developed over time in consultation with operational staff. The structure of the EMS is discussed under the three distinct sections identified in the Draft EIS Guidelines:

- Policy and Planning
- Implementation and Operation
- Checking and Review.

As described earlier, Matilda intends to develop its EMS in line with the requirements of the MMP, to ensure efficient use of resources in managing its safety and environmental responsibilities and to ensure that annual reviews of both instruments are undertaken in parallel.

Risk assessment

In order to determine EMP requirements to be addressed by the EMS, a qualitative evaluation of potential impacts likely to be associated with the proposed sand mining operations has been carried out by URS. This risk assessment was based on Australian Standard AS/NZS 4360:2004 Risk Management, utilising the information contained in this Draft EIS.

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 pre-defined qualitative matrix to ascertain significance. Matilda has adopted this standard to assess the environmental risks and corresponding environmental management requirements for the proposed operations on the Tiwi Islands.

Assessments were undertaken by a team of expert Environmental Scientists and Engineers from URS and reviewed by Matilda. Members of the team undertook an initial literature review, analysed baseline survey data, reviewed design layouts, and analysed the impacts of the proposed operations based on information provided by Matilda and past experience. The results of this operational risk assessment are presented in the main body of the Draft EIS.

Environmental management plans

Fundamental to the implementation of the EMS at an operational level is the development of EMPs. These EMPs address aspects of the organization's operations that may potentially impact the environment. They include consideration of legal and other obligations, and objectives and targets to measure environmental performance.

During the environmental risk assessment process, the need for EMPs and procedures to manage specific issues was analysed in detail. As a result Draft EMPs have been developed for

- Flora
- Fauna
- Sea turtles management
- Ground water quality protection
- Surface water quality protection
- Hydrocarbon and hazardous substances management
- Waste management and disposal
- Dust and noise
- Fire management

- Pest, weeds and diseases
- Environmental radiation management plan
- Biting insects.

These Draft EMPs will include design considerations, operational procedures, construction procedures, operational practices and inspection and monitoring programs to be implemented by Matilda to minimise the Project's environmental impacts. The EMS will also be reviewed and audited on a regular basis, to ensure that it is working efficiently.

It is noted that these EMPs are presented in draft format only. These working EMPs will be developed further over time in consultation with operational staff.

Environmental Management System and Environmental Management Plans

Matilda commits to developing an EMS to assist them in managing their environmental responsibilities and to allow for continuous improvement of their EMS.

Matilda commits to ensuring that the required resources are available to establish, implement, maintain and improve the EMS and the EMPs.

Matilda commits to creating a monitoring, inspection and audit program to ensure the effectiveness of the EMS and the EMPs.