12.1 Existing air quality

Climatic conditions of the prospect areas are described in detail in Section 3.1. The winds are predominantly north-westerly in the wet season, and south-easterly in the dry season (TLC 2004), with annual average wind speeds of 7.7 km/h and 14.8 km/h at 9 am and 3 pm respectively (BOM 2005).

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 releasing carbon monoxide (CO) into the atmosphere.

The haze is caused by atmospheric temperature inversions occurring during the dry season through radiant cooling of the Earth's surface at night. The smoke haze is trapped close to the surface and can form a blanket of haze over the region (Tunstall *et al.* 1998).

Main connecting roads between the communities are regularly maintained, however other tracks often receive only irregular and cursory maintenance. Insufficient funds have led to a decline in road maintenance resulting in increased soil erosion (TLC 2004).

Dust from unsealed roads is also a localised contributor to dust levels in communities, in particular on dry and windy days. Poor road maintenance can also lead to an increase in dust emissions during the dry season.

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.

12.2 Objectives and standards

The transport of mineral sands, people, fuel, other consumables and mining materials will be along designated well-maintained haul roads, which will be watered regularly to reduce the amount of suspended particles released into the atmosphere.

Matilda proposes to progressively rehabilitate disturbed areas immediately following mining (Figure 2.2) to stabilise the soils and to promote re-vegetation. This will also minimise the effects of wind erosion and dust generation from mining cleared areas.

Matilda will report fossil fuel usage and greenhouse emissions [carbon dioxide (CO_2) only for this project] on an annual basis. Matilda will endeavor to decrease greenhouse gas emissions through the efficient use of resources. Matilda will also commit to minimising the area of land cleared at any point in time to reduce the amount of CO_2 released into the atmosphere.

Matilda has also developed a Draft Fire Environmental Management Plan to reduce the risk of wildfires emanating from the operational and infrastructure areas of the proposed mining operations. Issues relating to fire management are discussed in Section 15.

Relevant legislation, standards and policies

The relevant legislation, standards and policies are:

- Matilda's Safety and Health Policy
- Matilda's Environment Policy
- *Work Health Act 1986*
- *Soil Conservation and Land Utilisation Act 1980*

12.3 Definition of issues and impacts

12.3.1 Dust

There is potential for dust emissions to arise during:

- Construction of the camp and processing plant;
- Upgrade of the haul roads;
- On-going clearance and rehabilitation activities for mining operations;
- Mobile plant movement, in particular during excavation, loading and transportation of the sand via a six-wheeled truck along the mineralised zone to the feeder, and return;
- Haulage by road trains of the mineral sands concentrate to the port facilities;
- During storage and loading activities at Port Melville; and
- Other vehicle usage, including around the mining area, for transportation of personnel and materials to and from the mine site.

It is noted that the area for the proposed storage shed and concentrate handling and shipping activities at Port Melville has been cleared for some years, and has been used in the past for other port-related activities. Thus there would be no additional land clearance required at Port Melville for the project.

Suspended particulate matter is dust that stays suspended in the atmosphere for significant periods. The current nomenclature is to describe fractions of suspended particulate as:

- PM10: all particulate effectively less than 10 microns (µm) in diameter;

- PM2.5: all particulate effectively less than 2.5 µm in diameter; and
- TSP: total suspended particulate, generally up to about 100 µm in diameter.

Within the range of suspended particulate, the group of particles which are sized 10 µm or less (PM10) have been associated with health effects. Particles that are larger than 10 µm tend not to be able to penetrate the respiratory tract, and do not appear to be significant with respect to potential health effects (NSW EPA 2003).

The concentrate material will be coarse, with less than 1% being of size <10 µm. Table 5.1 summarises the tailings size expected at Andranangoo; less than 0.1% is of size <63 µm. Because of the moisture content and large particle size, it is not expected that dust arising from mining activities will be a health or nuisance issue.

The mineral sands concentrate will be stored at the processing area at the mine sites, and at Port Melville, in sheds equipped with bunded concrete floors. The sheds would minimise fugitive dust emissions from the stockpiles within, and the bunds will assist in preventing mineral sands concentrate from dispersing from the sheds.

Owing to the containment within the sheds, and the coarseness and dampness of the mineral sands concentrate, it is not expected that dust emissions will be an issue during storage and handling at either the mine sites or at Port Melville. If the surface of the mineral sands were to dry to an extent where dusting may occur, the stockpile surface would be dampened prior to handling.

During the dry season the risk of wildfires is generally high. Fires are generally confined to understorey and grass cover, and can generate smoke that leads to a marked reduction in visibility over very large areas, and an increase in CO_2 levels. The majority of the fires lit on the Tiwi Islands are deliberately lit for fire management purposes. As a result, bush fires are generally of low intensity. Matilda will utilise reduction burning techniques as a fire management tool around the mine camp and mine area.

12.3.2 Greenhouse emissions

CO_2 arises naturally in forest fires, volcanic activity and marsh gases. It is also sourced from incomplete combustion of fuels particularly in motor vehicles, generators and burning wood. As the mine operation is small in scale, CO_2 emissions will also be correspondingly low. An estimate of net emissions of CO_2 over the life of the mining operation is provided in Appendix F and is summarised in Table 12.1.

Table 12.1: Net 'Whole of Life' Emissions of CO_2 Equivalent from Mine Operations

(Units: tonnes of CO_2 equivalent)	Mine development	Operations	Decommissioning and rehabilitation
Land clearing	10,804		
Built infrastructure	805		
Fuel use for operations		37,184	
Land rehabilitation			- 8,643 (80%)
Sale of built infrastructure			- 645 (80%)
Total for each phase	11,609	37,184	- 9,288
Net emissions over mine life	**39,505**		

12.4 Management

The proposed mining locations are remote and there are no residents in proximity to the site, which will negate the impact on surrounding human populations. The wind direction is predominantly north-westerly in the wet season, and south-easterly in the dry season. Thus the prevailing wind direction during the dry season would take any emitted particles offshore away from populated areas.

Clearing operations are a minor part of the operation, but as the sand is well washed by centuries of sea action, the sand is relatively coarse and will produce minimal dust. The sand as it is mined will be damp (4-5% moisture), and so dust emissions during mining will also be minimal.

The proposed mineral sand processing methodology is a wet separation process, and as such will not produce dust emissions. Concentrate will be stored in a roofed storage shed. While stored, the concentrate is expected to dry on the surface to some extent, but overall is likely to remain at above 5% moisture. As such, and also owing to the coarseness and high specific gravity of the material, dust is not expected to be an issue during mining, processing and handling operations.

As noted above, the mine and haulage road is well away from populated areas. The road will be maintained to ensure its suitability for use, and will be regularly watered from water bores along the haul road during dry and windy weather.

Areas disturbed by mining will be rehabilitated progressively, which will reduce the potential for dust generation from exposed areas.

As noted above, the mineral sands concentrate will be stored at the processing areas at the mine sites, and at Port Melville, in sheds equipped with bunded concrete floors. The sheds would minimise fugitive dust emissions from the stockpile within, and the bunds will assist in preventing mineral sands concentrate from dispersing from the sheds.

Owing to the containment within the sheds, and the coarseness and dampness of the mineral sands concentrate, it is not expected that dust emissions will be an issue during storage and handling at either the mine sites or at Port Melville. If the surface of the mineral sands were to dry to an extent where dusting may occur, the stockpile surface would be dampened prior to handling.

Matilda has developed a Draft Dust and Noise Environmental Management Plan which details actions and targets for managing dust issues which is presented in Section 25.8. If dust does become an issue at any time, Matilda will initiate additional dust suppression measures as required.

12.5 Commitments

Matilda commits to progressive rehabilitation to stabilise the soils and to promote re-vegetation to minimise the effects of wind erosion and dust generation (Section 12.2).

Matilda commits to decreasing greenhouse gas emissions through the efficient use of resources (Section 12.2).

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 (Section 12.2).*

Matilda commits to watering down roads to reduce the amount of dust emissions (Section 12.2).

Matilda commits to further suppression measures if dust becomes an issue (Section 12.4).