18.1 Background

A biting insect evaluation is required under the planning provisions by the NT Government to consider the impact of development on biting insect populations, and the impacts of biting insects on the workforce (Warchot and Whelan 2005).

Therefore as part of the Draft EIS study, URS commissioned a biting insect survey of the Andranangoo and Lethbridge mineral sands mining prospects. This work was undertaken by Medical Entomology Branch, Department of Health and Community Services (DH&CS), Northern Territory Government.

Biting midges can be considerable pests within a few kilometres of the coast in the NT (Whelan 1991). These pests can disrupt the work force by causing direct effects due to their painful bites, and indirect effects due to secondary infection and loss of a sense of well being. As the study sites are located adjacent to tidal mangrove creek areas, it was considered a possibility that pest biting midges would be present at the development sites, in particular the mangrove biting midge *Culicoides ornatus* (Warchot and Whelan 2005).

Mosquitoes are a serious potential public health issue in the NT, both as pest insects and as vectors of a number of human diseases including the potentially fatal Murray Valley encephalitis virus, and a number of other diseases caused by Kunjin Virus, Ross River virus and Barmah Forest virus. The Andranangoo and Lethbridge prospects are both located adjacent to extensive tidal and freshwater influenced swamps, which could be expected to provide breeding sites for a number of mosquito species such as the salt marsh mosquito *Ochlerotatus vigilax*, the common banded mosquito *Culex annulirostris* and the North Australian malaria mosquito *Anopheles farauti s.l* (Warchot and Whelan 2005).

Biting insect trapping was conducted on the night of the 29th September 2005 at Andranangoo, and on the night of the 30th September 2005 at Lethbridge. Investigations and post-survey work have included:

- Surveys of the environment around the site to identify possible sources of biting insects both through field investigations and examinations of aerial photography;
- Assessment of the potential for the creation of new mosquito breeding sites as a result of mining activities;
- Establishment of a pre-, during and post wet season mosquito monitoring program, which will be conducted by Matilda staff;
- Providing guidance on how to prevent the creation of new mosquito breeding sites at the mine sites; and
- Providing information on how to reduce biting insect populations and prevent mosquito-borne disease transmission at the development sites (Warchot and Whelan 2005).

The DH&CS also trained Matilda staff to collect specimens from the traps. Follow up trapping will be conducted by Matilda and the contents shipped to DH&CS for analysis. Trapping will be conducted for another three occasions with one trapping event occurring one day before the full moon in November 2005. This is likely to give a better indication of potential biting midge pest issues, in particular *Culicoides ornatus,* at both prospect areas (Warchot and Whelan 2005).

The sampling methodology of the surveys and the full report from DH&CS is presented in Appendix H.

18.2 Existing conditions

Biting midges

A total of five (5) species of biting midge were collected during trapping at Andranangoo. The most common species of biting midge trapped was *Culicoides marksi*, accounting for 57% of all midges, followed by *Culicoides* undescribed species No. 6 (30%), *Culicoides ornatus* (3.41%) and *Culicoides austropalpalis* (1 %), with a single *Lasiohelia sp*. specimen also collected (Warchot and Whelan 2005).

A total of seven (7) species of biting midge were collected at Lethbridge. The most common species collected was *C. austropalpalis*, accounting for 58% of all biting midges trapped, followed by C. undescribed species no. 6 (23%), *C. marksi* (4%), *C. ornatus* (1.37%), *C. narrabeenensis* (1.10%) and *C. histrio* and *C. bundyensis*, for which single specimens were recovered (Warchot and Whelan 2005).

It is noted that trapping was not conducted around the full moon, so pest problems from the main human pest biting midge species *Culicoides ornatus* could not accurately be predicted. On-going monitoring programs are likely to give a better indication of potential biting midge pest problems at both prospect areas (Warchot and Whelan 2005).

Mosquitos

A total of thirteen (13) species of mosquitoes were collected at Andranangoo. The most common mosquito species trapped was the salt marsh mosquito *Ochlerotatus vigilax*, accounting for 59% of all mosquitos trapped. This was followed by *Culex annulirostris* (24%), *Coquillettidia xanthogaster* (6%), *Anopheles bancroftii* (4%), *Culex sitiens* (3%) and *Anopheles farauti s.l.* (1%). All other mosquito species were trapped in very low numbers (Warchot and Whelan 2005).

A total of nine (9) species of mosquitoes were collected at Lethbridge. The most common species trapped was the salt marsh mosquito *Oc. vigilax*, accounting for 81% of all mosquitoes trapped. This was followed by the common banded mosquito *Cx. annulirostris* (13%), *Cx. xanthogaster* (5%), with all other mosquito species trapped in very low numbers (Warchot and Whelan 2005).

18.3 Objectives and standards

As part of its biting insects control policy, Matilda will:

- Continue to consult with DH&CS regarding requirements for managing and monitoring biting insect issues at Andranangoo and Lethbridge;
- Draw upon guidelines provided by DH&CS to minimise the risk of staff and subcontractors being exposed to biting insects and to minimise the risk of transmission of mosquito-borne diseases; and
- Focus on progressively rehabilitating mined areas as soon as practicably possible and ensuring that the post-mining landform is consistent with the pre-mining landform and the surrounding undisturbed area wherever possible. This will include ensuring that reinstated landforms do not create additional biting insect breeding sites.

Relevant Legislation, standards and policies

The relevant legislation, standards and policy are:

- Matilda's Safety and Health Policy
- *Public Health Act 1952*

18.4 Definition of issues and impacts

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 and Whelan 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 and Whelan 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 and Whelan 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 and Whelan 2005).

18.5 Management

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 pest insect 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 exclude mosquitos.

If there are proven to be biting midge pest problems at either prospect, 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 may be achieved by using bifenthrin barrier treatments (Warchot and Whelan 2005).

Matilda employees will be tested for malaria before they enter on to the Island and annually, as the risk of potential malaria transmission will occur if a person infected with malaria is exposed to mosquito bites from *Anopheles farauti s.l.*

Rehabilitation of the mining areas should be conducted in a manner that prevents the creation of new mosquito breeding sites which could affect the future use of the land, or disperse to existing or future development areas (Warchot and Whelan 2005).

Matilda staff will continue to monitor for biting insects. Trapping will be conducted as follows (Warchot 2005):

- one day before the full moon in November 2005 to determine peak season pest biting midge numbers;
- one day before the full moon in January 2006 to determine peak mid wet season abundance of freshwater breeding mosquitos; and
- one day before the full moon in May 2006 to determine post wet season peaks in most freshwater and brackish water mosquito species.

Specimens collected in this trapping work will be sent to the DH&CS for identification.

18.6 Commitments

Matilda commits to working with DH&CS to continue biting insect trapping to gather baseline data (Section 18.1).

Matilda commits to reducing the possible biting insect breeding locations by employing a continuous rehabilitation program and ensuring watered areas are inspected regularly (Section 18.3).

Matilda commits to preventing the introduction of malaria onto the island by ensuring employees undergo malaria tests annually or when they return from overseas (Section 18.3).