



Appendix N Biting Insect Management Plan



Sherwin Iron (NT) Pty Ltd
Sherwin Creek Iron Ore Project
Environmental Impact Statement



2013





Biting Insect Management Plan: Sherwin Creek Iron Ore Project

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1 Introduction

Sherwin Iron (NT) Pty Ltd (Sherwin) proposes to develop an iron ore mine in the Roper River region of the Northern Territory. Through the Environmental Impact Statement guidelines it was requested that a Biting Insect Management Plan be developed for this Sherwin Creek Iron Ore project. The Biting Insect Management Plan has been developed with reference to the Northern Territory's *Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites* (Whelan and Warchot 2005).

This initial Biting Insect Management Plan is intended to minimise potential impacts or issues concerning biting insects as a result of works associated with the Sherwin Creek Iron Ore project. Potential issues identified include;

- Local transmission of mosquito borne diseases
- Increase in adult mosquito populations
- Increase in mosquito breeding sites.

Mine site infrastructure has the potential to create new mosquito breeding sites or increase the yield at existing sites. Potential breeding areas can be created in or around construction works, water storage facilities, sediment traps, pit dewatering, waste water disposal, mine waste dumps, site clearing, gravel pits and storage of artificial receptacles. Any equipment sourced from north Queensland that is capable of holding even a small amount of water can potentially harbour the eggs of the dengue mosquito *Aedes aegypti*. Mitigation measures will be put in place to prevent the introduction of this species.

2 Project Setting

Sherwin holds a number of tenements containing numerous iron ore deposits in the Roper and Hodgson Rivers area. Currently Sherwin are proposing to mine Direct Shipping Ore (DSO) reserves in the Sherwin Creek area (Deposit C) from within EL24101. The project area is within the Mount McMinn pastoral lease.

The predominant land uses in the region are pastoralism, traditional uses by Aboriginal people and mining. Mines are currently being developed to the east (Western Desert Resources Limited's Roper Bar Iron Ore Project) and west (Australian Ilmenite Resources) of this proposal.

DSO is proposed to be transported by road train along the Roper Highway to the Adelaide-Darwin railway near Mataranka. DSO will be transported to Port Darwin by rail, where it will be loaded into bulk carriers for shipment to overseas markets.

The entire area is currently largely undeveloped with the largest nearby communities being Ngukurr (45 km east; approximate population 1100) and Minyerri (60 km south-south-west; approximate population 450).

3 Monitoring Studies

3.1 Previous Studies

Baseline biting insect surveys have been performed in the region for the McArthur River Mine project for sites at the mine, Bing Bong Port and Borroloola in 1994, and Western Desert Resources at its iron ore project on the Towns River. These surveys were performed in conjunction with the Medical Entomology Branch of the Northern Territory Department of Health. The most relevant information from these surveys to the Sherwin's project is the information gathered from the Towns River (Department of Health 2012).

The preliminary work conducted by the Department of Health (2012) in the Towns River area indicated that the entire site is likely to be affected by high seasonal numbers of pest and potentially disease carrying mosquitoes. Greatest risk periods were assessed to be during the wet season and early dry season. The draft report (Dept. Health 2012) discussed a number of species of concern.

- *Aedes normanensis* can be a major pest mosquito, biting during the day in shaded areas, and during the night. It is a potential vector of Ross River virus (RRV), Barmah Forest virus (BFV), and Murray Valley encephalitis virus (MVEV)
- *Culex annulirostris* and *Cx. palpalis* can be major pest mosquitoes, are potential vectors of RRV, BFV, MVEV and Kunjin virus. These species only bite at night
- *Anopheles* species mosquitoes pose a potential risk of malaria transmission. *Anopheles* species mosquitoes only bite at night, and can be appreciable pest mosquitoes
- Tree hole breeding mosquitoes such as *Ae. elchoensis* may cause localised pest problems in areas of uncleared woodland.

The Department of Health (2012) recommended that workers at the Western Desert mine take suitable steps to protect themselves from mosquitoes, and Western Desert adopt measures to reduce mosquito problems such as spraying with a suitable residual insecticide such as alpha-cypermethrin or bifenthrin

3.2 Sherwin Baseline Monitoring

A 12 month baseline adult mosquito monitoring program was commenced in August 2013 in line with the recommendations outlined in the *Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites* (Whelan and Warchot 2005). Information gathered from the baseline survey will provide detail on mosquito species present, their relevant numbers, and the temporal and spatial distribution of mosquito species in the area. The baseline survey will also assess the relative potential impact of mosquito borne disease to mine personnel. A detailed report will be produced by the Department of Health at the end of the baseline surveys in September 2014. This information will be utilised to further refine management methods and inform personnel of peak abundance periods.

Four trapping sites were established in August 2013 (Figure 1). These sites were selected to coincide with areas of likely human activity or residence (the mine and camp), and in areas where conditions appeared to be favourable for mosquitoes (along Sherwin Creek line).

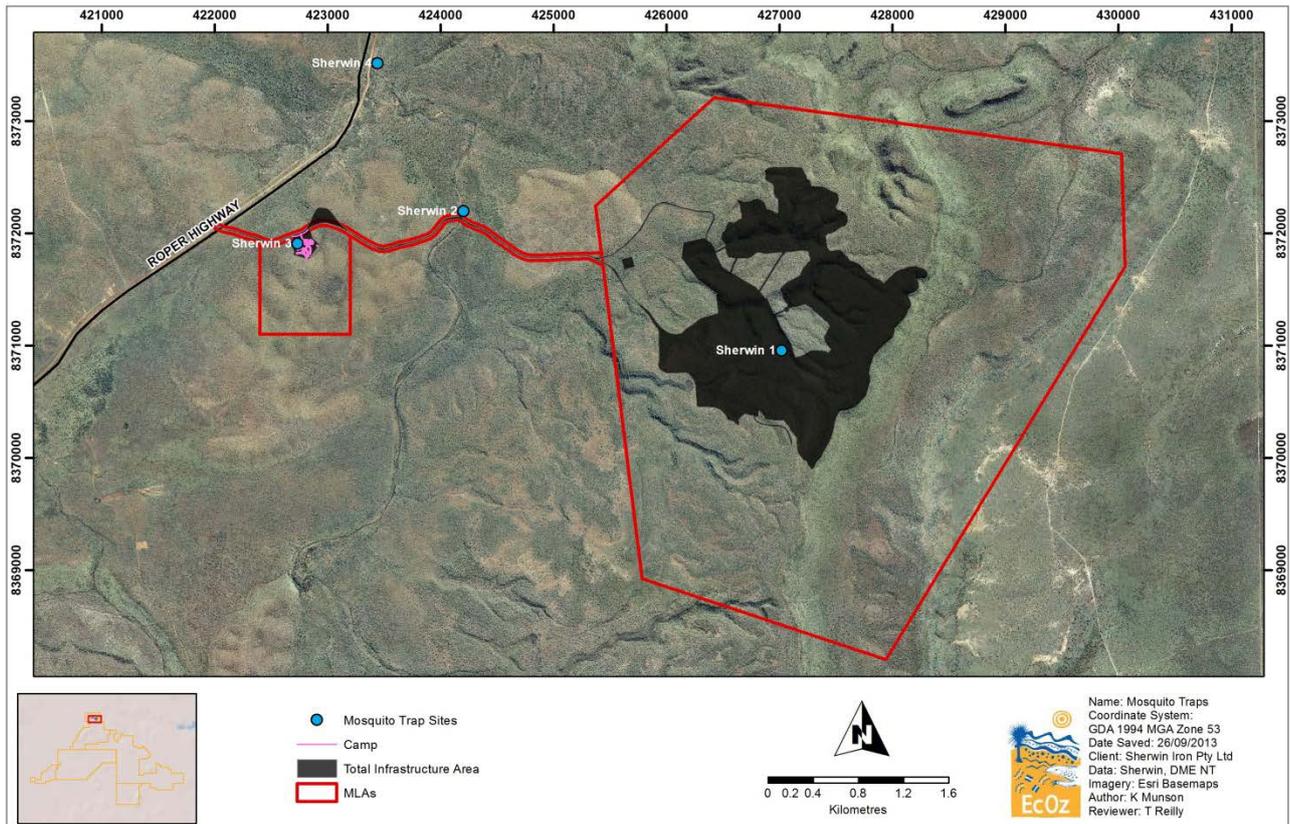


Figure 1. Adult mosquito trap locations.

The initial trapping event occurred on the night of 6-7 August 2013 and used carbon dioxide traps for adult mosquitos. Mosquito numbers from this trapping event were very low with a total of 14 adult mosquitos being trapped from the two sites along Sherwin Creek, and no mosquitos being trapped from the mine or camp sites. Three species of mosquito were collected from the Sherwin Creek traps.

- *Culex annulirostris*, which are potential vectors of RRV, BFV, MVEV and Kunjin virus
- *Anopheles amictus* and *A. annulipes s.l.*, which both pose a potential risk of malaria transmission.

These three species are all active only at night and can all be potentially significant pest mosquitos.

The low trapping success suggests that mosquitos will not be much of a problem during the mid-to late dry season, although their presence in the late dry indicates that the numbers of these mosquitos may reach pest thresholds during the peak season for these species in the late wet to early dry seasons. Subsequent trapping will determine if this is the case.

4 Management and Monitoring

Management actions will be incorporated into the development and management of the mine site to prevent mosquito breeding opportunities and to reduce the potential for contact between personnel and mosquitoes. These actions are:

1. Prevent the potential of increasing mosquito populations through appropriate water storage:
 - Infrastructure will be designed to minimise potential mosquito breeding sites
 - Periodic cleaning of vegetation and silt from around sediment dams and water impoundments
 - Maintenance of septic systems to prevent mosquito breeding opportunities
 - Periodic removal of potential artificial breeding sites
 - Clean all equipment sourced from north Queensland with 10% chlorine.
2. Reduce the potential for contact between personnel and mosquitoes:
 - Screening of all residential, eating and recreational areas
 - Installation of thick curtains inside buildings and yellow lights outside buildings to minimise mosquito attraction to light sources
 - Incorporate awareness of disease risk and prevention into the site induction to increase personnel awareness and responsibility to avoid contact with mosquitoes
 - Reinforce awareness during breeding season through periodic reminders of risk and prevention.
3. Monitor for mosquito outbreaks and respond to severe outbreaks or incidence of disease:
 - Trapping of adult mosquitoes once a month for the initial 12 months of mine operation to develop a baseline mosquito monitoring program
 - Inspection of potential breeding sites during peak breeding times
 - Application of a suitable barrier insecticide such as bifenthrin should mosquito problems arise
 - Isolation of personnel suspected of having the malaria virus to prevent contact with mosquitoes
 - Ensure incidences of notifiable disease are reported to the National Notifiable Disease Surveillance System.

5 Preventing Breeding Sites

Information concerning breeding sites, taken from *Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites* (Whelan and Warchot 2005) and applicable to the Sherwin Creek Iron Ore project have been summarised below.

5.1 Sediment Traps

- Sediment traps need to be designed where possible to be free draining within a period of 5 days after flooding
- Sediment traps that cannot be free draining within 5 days must be steep sided and have a sloping bottom base to one end, with erosion protection (e.g. reno mattress) at the inflow and overflow facility
- Sediment traps should be maintained by silt and vegetation removal on a bi-annual basis, prior to and immediately following the wet season. There should be a designated access path for silt removal
- Sediment traps with dry season low flows should be sampled for mosquito larvae monthly in the dry season and appropriate mosquito control programs arranged with the appropriate authority.

5.2 Drainage Paths

- Natural drainage patterns should be maintained where possible. Access roads across drainage lines may need to be fitted with culverts of sufficient size to prevent upstream flooding for periods that will enable mosquito breeding. Culverts should be installed flush with the upstream surface level. Erosion prevention structures will need to be constructed on the downstream side of any culvert, and erosion prevention structures may also be required at the headwalls of any culvert
- Any structures that have disrupted surface drainage should be removed at the end of the mining operations.

5.3 Waste Water Disposal

- Septic tanks must be installed to Department of Health guidelines and should be inspected on an annual basis by the Environmental Officer to ensure that tanks and their effluents do support breeding of mosquitoes
- Discharge, overflow and excess effluent from sewerage treatment systems must be disposed of in a manner approved by Department of Health. A sprinkler disposal system is suitable under most situations. Infiltration systems are acceptable if soil conditions are favourable. The discharge of excess effluent into ephemeral creek lines is not acceptable.

5.4 Artificial Containers

- Rainwater tanks must be adequately screened to prevent entry by mosquitoes
- Any container capable of holding water e.g. machinery tyres, drums, disused tyres, tanks, pots etc. should be stored under cover, be provided with drainage holes, emptied on a weekly basis, treated with appropriate insecticide on an appropriate schedule, or disposed of in an appropriate dump site to prevent the formation of mosquito breeding sites
- No used tyres, machinery or other containers that have previously held rain water should be brought to the NT from Queensland unless the containers or machinery has been thoroughly treated with

chlorine or an appropriate insecticide to remove the possibility of the introduction of drought resistant eggs of exotic *Aedes* mosquito species.

5.5 Rubbish and Garbage Dumps

- Rubbish dumps must be operated in such a manner that there is no ground surface or water filled receptacles pooling with water for a period greater than 5 days, to prevent the formation of mosquito breeding sites
- Rubbish dumps must be rehabilitated by filling and surface contouring to ensure they are free draining and have no surface depressions.

6 Decommissioning and Rehabilitation

A decommissioning and rehabilitation plan will be in place for all mining operations to ensure no actual or potential mosquito breeding sites remain after cessation of mining operations. All disturbed areas should be rehabilitated to be free draining where practical.

Aspects to consider when decommissioning and rehabilitating a mine site

- include removing and appropriately grading all sediment ponds
- removing all bund walls created for the development
- removing infrastructure and artificial receptacles that could pond water
- removing water dams and reinstating existing flow paths where practical
- rehabilitating gravel pits
- removing wetland filters, sediment traps, and other facilities that could pond water and breed mosquitoes.

7 Acronyms and References

7.1 Acronyms

BFV	Barmah Forest virus
DSO	Direct Shipping Ore
EL	Exploration Lease
MVEV	Murray Valley encephalitis virus
RRV	Ross River virus

7.2 References

Department of Health 2012, *Western Desert Resources Roper Bar Iron Ore Mine Adult Mosquito Trapping February 2012*, Draft Report, Northern Territory Government.

Whelan, P and Warchot, A, 2005 *Guidelines for the preventing mosquito breeding sites associated with mining sites*, November 2005, Department of Health and Families, Northern Territory Government, Darwin, Australia.