

Introduction

A probable record of the Ornamental Snake was made by RPS from the area of Brigalow TEC. Previous surveys by Ecological Survey & Management in the Moura area have found this species to be locally abundant and it is therefore considered very likely that this species does occur within the study area.

This species is known to persist in areas that contain gilgai even though they have been cleared of woody vegetation as the snake uses soil cracks for shelter (Veary 2011 and S. Marston pers. obs.). However, habitat that maintains microhabitat features such as leaf litter and woody debris are considered likely to be of higher value for this species. Therefore, the areas of the TLO site that support Brigalow vegetation are mapped as high quality habitat for this species. The cleared areas of the site that support gilgai formations are mapped as medium quality habitat for this species as these areas are likely to also support Ornamental Snakes but lack leaf litter and woody debris. A total of 10.22 ha of high quality and 113.09 ha of medium quality habitat have been mapped within the study area (Figure 3).

The construction of the TLO facility would result in the removal of 3.20 ha or 31.3% of high quality habitat and 59.11 ha or 52.3% of the medium quality habitat mapped on the site.





Legislative requirements

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
- Queensland *Nature Conservation Act 1992*

Environmental Protection Objectives

- No direct mortality of Ornamental Snake individuals during construction and operation of the TLO facility
- Maintain population numbers of the Ornamental Snake on the TLO Site at or as close as possible to current levels

Environmental control strategies/commitments

Construction Phase

- A pre-clearing survey targeting the Ornamental Snake will be conducted by a suitably qualified ecologist over 5 nights within the proposed disturbance footprint immediately prior to clearing to capture snakes from the proposed disturbance footprint and relocate these snakes to similar habitat on or immediately adjacent to the site but a minimum of 500 m from the area to be disturbed. The survey will involve 4 pitfall traps and 3 pairs of funnel traps within each patch of high quality habitat to be disturbed as well as a minimum of 1 person hour of active searching and 4 person hours of spotlighting each night over a minimum of 4 nights to capture and relocate snakes. The possibility of radio tracking a proportion of relocated snakes to assess the success of relocation will also be investigated.
- A pre-clearing inspection will be undertaken by a spotter catcher prior to clearing associated with the construction of infrastructure. The inspection will be undertaken in accordance with the requirements of a Species Management Program, with the aim of minimising disturbance to breeding species and direct harm to MNES. This inspection will involve searches of habitat features such as logs, fallen bark and if possible, soil cracks.

Operational Phase

- To minimise the risk of snakes being struck by trains or haul trucks and to minimise the effects of habitat fragmentation, it is proposed to install culverts at locations where the haul road and rail loop traverse the mapped areas of high quality Ornamental Snake habitat and medium quality habitat. 'Furniture' such as rocks and logs will be installed within and adjacent to culverts. The relatively flat topography of the TLO site has limited the maximum height of culverts that can be installed to 450 mm without incurring significant cost to raise the height of the entire rail loop formation. The proposed location and size of fauna underpass culverts is shown on Figure 4.
- It is proposed to install exclusion fencing in areas where the rail loop and haul road traverse high quality Ornamental Snake habitat and extending a minimum of 20 m either side of the patch of high quality habitat. The exclusion fence will comprise sheet metal (or similar material that does not allow snakes to climb over or through) attached to star pickets with the bottom of the fence buried a minimum of 100 mm below the soil surface. The sheet metal (or similar) should have a minimum height of 300 mm above the soil surface. This configuration will prevent snakes and other fauna from accessing the railway track and haul road. The location of the proposed exclusion fencing is shown on Figure 4.

Monitoring and reporting

It is proposed to incorporate this Ornamental Snake Management Plan into the Site Based Management Plan for the construction and operation of the TLO facility due to the amount of potential habitat for this species identified on the TLO site. This management plan includes the following aspects:

- A monitoring program during clearing operations to monitor the fate of snakes translocated during pre-clearing surveys immediately prior to construction.
- Trials will be conducted to determine if modern infra-red cameras are capable of detecting snakes to use for monitoring of snake use of culverts.
- Conduct targeted surveys for Ornamental Snakes permanently marking each snake captured to allow mark – recapture analysis and gross movements of snakes between monitoring events to be determined (e.g. from one side of the rail loop to the other). The method of marking snakes will be determined in consultation with the relevant animal ethics committee but could include techniques such as branding (Winne et. al. 2006) or Passive Integrated Transponder (PIT) tags.
- Monitoring of installed culverts will be undertaken twice per year between October and December and February and April for two years following construction and then annually thereafter for a period of 5 years. Monitoring will use infra-red cameras at each culvert location if trials show that cameras are effective at detecting snakes. The use of a substrate to maximise temperature differential and increase the detectability of snakes will be investigated. For example, cork tiles were found to increase the detectability of reptiles with infrared cameras (Welbourne 2013). Monitoring of the use of culverts will be undertaken in conjunction with targeted surveys for Ornamental Snakes.
- During these bi-annual monitoring events, the trail loop and haul road should be checked each morning to search for snakes that may have been struck by trains or haul trucks to ensure that the exclusion fencing is effective.
- Staff and contractors will be trained about the potential for Ornamental Snakes to occur within the TLO facilities and to report any snakes found particularly any that have been struck by trains or haul trucks.

Auditing

- Data from the pre-clearing survey will be reviewed at the completion of the survey
- During initial vegetation clearing for construction, a weekly review of spotter catcher data will be undertaken and presented in a monthly report
- Internal audits will be undertaken by 6 monthly basis
- External auditing would be undertaken annually.

Corrective action

- If an Ornamental Snake is killed or injured during the construction process, construction methodology will be reviewed to identify any additional measures that can be implemented to reduce the potential for snakes to be killed or injured.
- If monitoring of culverts indicates that Ornamental Snakes onsite are not moving through the culverts trials will be undertaken to determine if any measures can be implemented to encourage the snakes to use culverts.