



28 Suncrest Avenue
Lenah Valley, TAS 7008
mark@ecotas.com.au
www.ecotas.com.au
(03) 62 283 220 (personal)
0407 008 685 (mobile)
ABN 83 464 107 291

Australian Bauxite Limited

ATTENTION: Tamara Coyte (Project Geologist)
Level 2 131 Macquarie Street
Sydney NSW 2000

29 October 2015

Dear Tamara

**RE: Fingal Rail Bauxite Exploration
Threatened flora survey – test pits**

Preamble

Environmental Consulting Options Tasmania (ECOtas, Mark Wapstra) was engaged by Australian Bauxite Limited to provide advice in relation to the management of test pits at the Fingal Rail project site, primarily in relation to threatened flora.

I have previously assessed the broader project area (ECOtas 2013, 2014) and additional surveys have been conducted for various values (e.g. Milner 2010). The present statement relates to a recently closed test pit (northern area) and a proposed new test pit (southern area).

Methods

The following statement is based on a site assessment conducted on 21 October 2015 by Mark Wapstra in the company of Tamara Coyte (Australian Bauxite Limited).

Recently closed pit

The recently closed pit (c. 20 m rectangular area) was examined by criss-cross meandering transects to determine the presence of threatened flora (none detected so further methods not outlined at this point) and weeds. A list of vascular plant species present in the rehabilitated site was compiled. A plot of approximately equal dimensions to the test pit was established immediately adjacent (west of) the test pit, and a list of vascular species recorded to allow a comparison of diversity to be made. Semi-permanent photo-points were established.

Proposed pit

A semi-permanent transect was established by running a 100 m tape from the southwest marker peg to the northeast marker peg. Every 10 m, a 5 x 5 m plot centred on the 10 m interval (so starting at the 0 m mark and finishing at the 80 m mark) was scored. The plot extended 2.5 m each side of the stretched tape and 2.5 m backwards and forwards from the 10 m interval.

ECOtas...providing options in environmental consulting

For each plot, all vascular species present were recorded, and their abundance noted using a modified Braun-Blanquet abundance score (a standard measure in ecological surveys): 1 = 0-5% cover; 2 = 5-25% cover; 3 = 25-50% cover; 4 = 50-75% cover; 5 = 75-100% cover.

Photo-points were taken from the 0 m, 30 m and 50 m marks (along the transect) and the 80 m transect (back down along the transect).

The remainder of the estimate 20 m pit width was searched for threatened flora and other vascular plant species.

Findings

Recently closed pit

Appendix A compares the vascular species recorded for the pit and the adjacent area. In general terms, the pit has a similar diversity of plant species to the less disturbed site. There are, however, a small number of exotic plant species including *Reseda luteola* (1 individual), *Cirsium vulgare* (several individuals) and some ubiquitous exotic grasses and herbs.

As discussed on site, follow-up herbicide treatment and/or hand-grubbing (with a small hoe for example) will probably largely eradicate the extent of these herbaceous weeds on the test pit site.

Appendix B provides images of the site. While it appears to be tree-less, this is the approximate condition prior to the test pit being cleared. It is understood that only one tree was removed. As such, I do not see a need to proactively re-establish a tree canopy on this small area. Natural regeneration will probably mean that *Eucalyptus amygdalina* and/or *E. viminalis* will establish in a relatively short timeframe.

No threatened flora were detected from the recently closed pit and previous surveys had established that this area did not apparently support such species. *Siloxerus multiflorus* (small wrinklewort) was detected in the adjacent "control" plot on the surface of the old track through the forest, perhaps indicative that the species will colonise the bare ground of the closed pit. Ongoing monitoring will be useful to establish how quickly threatened flora colonise such disturbed ground.

At present the pit area supports a marginally higher diversity of plant species compared to the adjacent less disturbed site but the difference in diversity is largely due to a higher number of exotic species (although there is some variation in the composition of both sites). In the absence of pre-disturbance data it is impossible to know if the "missing" species from the pit area (as recorded in the adjacent less disturbed area) were ever present so at best this data indicates some broad trends.

Proposed pit

Appendix C provides the list of vascular species recorded along the transect, with their abundance scores. Appendix D provides the photo-points.

No threatened flora were detected from the transect or the wider area of the proposed pit. As such, the test pit will not require a permit under Section 51 of the Tasmanian *Threatened Species Protection Act 1995*.

The transect should be re-established post-works and monitored periodically in spring (ideal is around mid- to late-October) to determine if threatened flora colonise the disturbed ground and the impact on recovery of vascular flora.

Conclusions

The test pits represent a highly localised disturbance but have the potential to be colonised by pioneer weed species, although the scale of colonisation is limited by the extent of disturbance.

Utilising on-site stockpiled topsoil is preferential to importing gravel/soil from another site (even from the general area).

Data comparing disturbed and undisturbed sites (such as the recently closed pit) and collection of more formal transect-based data to allow for a comparison of pre- and post-disturbance floristic composition (such as had been established for the proposed pit) is recommended.

Please do not hesitate to contact me for further information.



Mark Wapstra
Manager/Senior Scientist

REFERENCES

- ECOtas (2013). *Threatened Flora Survey of Proposed Bauxite Mine, Esk Main Road, East of Conara ("Fingal Rail"), Tasmania*. Report by Environmental Consulting Options Tasmania (ECOtas) for Australian Bauxite Limited, 19 November 2013.
- ECOtas (2014). *Ecological Assessment of Proposed Bauxite Mine, Esk Main Road, East of Conara ("Fingal Rail"), Tasmania*. Report by Environmental Consulting Options Tasmania (ECOtas) for Australian Bauxite Limited, 19 May 2014.
- Milner (Philip Milner Landscape Consultant Pty Ltd) (2010). *Fingal Rail Target Area: Botanical & Fauna Habitat Survey of Proposed Drill Sites*. Report for ABx Pty Ltd, 11 October 2010.

Appendix 1. Species present in recently closed pit and adjacent less disturbed forest
Species listed as threatened are highlighted in bold type, those considered naturalised with a *.

| Species | Test pit | "Control" |
|---|----------|-----------|
| <i>Acacia dealbata</i> | + | + |
| <i>Acaena echinata</i> | + | |
| <i>Aira caryophyllea</i> subsp. <i>caryophyllea</i> * | + | + |
| <i>Astroloma humifusum</i> | + | + |
| <i>Austrostipa stiposa</i> | + | + |
| <i>Banksia marginata</i> | | + |
| <i>Bossiaea prostrata</i> | + | + |
| <i>Centaurium erythraea</i> * | + | + |
| <i>Centrolepis aristata</i> | + | + |
| <i>Centrolepis polygyna</i> | + | + |
| <i>Centrolepis strigosa</i> subsp. <i>strigosa</i> | + | + |
| <i>Cerastium vulgare</i> * | + | |
| <i>Chamaescilla corymbosa</i> | + | + |
| <i>Cirsium vulgare</i> * | + | |
| <i>Drosera peltata</i> | + | + |
| <i>Eucalyptus viminalis</i> subsp. <i>viminalis</i> | | + |
| <i>Euchiton japonicus</i> | + | |
| <i>Gonocarpus tetragynus</i> | + | |
| <i>Goodenia lanata</i> | + | + |
| <i>Hibbertia riparia</i> | + | + |
| <i>Holcus lanatus</i> * | + | |
| <i>Hydrocotyle callicarpa</i> | + | + |
| <i>Hypericum japonicum</i> | + | + |
| <i>Hypochoeris radicata</i> * | + | |
| <i>Isolepis platycarpa</i> | + | + |
| <i>Kennedia prostrata</i> | + | + |
| <i>Lepidosperma concavum</i> | + | |
| <i>Lepidosperma gunnii</i> | + | + |
| <i>Leucopogon virgatus</i> var. <i>virgatus</i> | | + |
| <i>Lissanthe strigosa</i> var. <i>strigosa</i> | | + |
| <i>Lomandra longifolia</i> | + | + |
| <i>Lysimachia arvensis</i> * | + | + |
| <i>Microlaena stipoides</i> | + | + |
| <i>Millotia tenuifolia</i> var. <i>tenuifolia</i> | + | + |
| <i>Oxalis</i> sp. | + | |
| <i>Pimelea humilis</i> | + | + |
| <i>Poa sieberiana</i> var. <i>sieberiana</i> | + | |
| <i>Poranthera microphylla</i> | + | |
| <i>Pultenaea pedunculata</i> | | + |
| <i>Reseda luteola</i> * | + | |
| <i>Rytidosperma</i> sp. | + | + |
| <i>Siloxerus multiflorus</i> | | + |

| Species | Test pit | "Control" |
|--|-----------|-----------|
| <i>Themeda triandra</i> | + | + |
| <i>Thysanotus patersonii</i> | + | + |
| <i>Viola hederacea</i> subsp. <i>hederacea</i> | | + |
| <i>Viola sieberiana</i> | + | |
| <i>Wurmbea dioica</i> subsp. <i>dioica</i> | + | + |
| Number of species | 40 | 34 |
| Introduced species | 7 | 2 |
| Threatened species | 0 | 1 |

Appendix 2. Images of recently closed pit and adjacent “control” site

These images comprise semi-permanent photo-points, with the camera location described in the caption.



Plate 1. (LHS) Control site: taken from NE to SW (from stump)

Plate 2. (RHS) Control site: taken from stump to stump along edge of old track



Plate 3. (LHS) Pit site: taken from NE to SW (from entrance to pit)

Plate 4. (RHS) Pit site: taken from NW to SE (from old track)

Appendix 3. Abundance scores of vascular plants on test pit transect

| Species | 0 m | 10 m | 20 m | 30 m | 40 m | 50 m | 60 m | 70 m | 80 m |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | PLOT 1 | PLOT 2 | PLOT 3 | PLOT 4 | PLOT 5 | PLOT 6 | PLOT 7 | PLOT 8 | PLOT 9 |
| <i>Eucalyptus amygdalina</i> | 0 | 2 | 0 | 0 | 0 | 2 | 3 | 1 | 1 |
| <i>Acacia dealbata</i> | 1 | 1 | 2 | 1 | 2 | 3 | 1 | 3 | 1 |
| <i>Hibbertia riparia</i> | 1 | 1 | 2 | 3 | 1 | 1 | 1 | 3 | 1 |
| <i>Leucopogon virgatus</i> var. <i>virgatus</i> | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| <i>Themeda triandra</i> | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Poa sieberiana</i> var. <i>sieberiana</i> | 1 | 0 | 2 | 3 | 2 | 3 | 1 | 1 | 2 |
| <i>Drosera peltata</i> | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| <i>Astroloma humifusum</i> | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| <i>Pimelea humilis</i> | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| <i>Lepidosperma concavum</i> | 1 | 4 | 2 | 0 | 2 | 0 | 0 | 0 | 0 |
| <i>Austrostipa stuposa</i> | 1 | 2 | 1 | 0 | 1 | 2 | 1 | 1 | 0 |
| <i>Allocasuarina littoralis</i> | 1 | 0 | 1 | 3 | 1 | 1 | 1 | 0 | 0 |
| <i>Aira caryophyllea</i> subsp. <i>caryophyllea</i> | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| <i>Millotia tenuifolia</i> var. <i>tenuifolia</i> | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Thysanotus patersonii</i> | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| <i>Glossodia major</i> | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| <i>Dianella revoluta</i> | 0 | 2 | 1 | 0 | 0 | 0 | 3 | 0 | 2 |
| <i>Lagenophora stipitata</i> | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| <i>Gonocarpus tetragynus</i> | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| <i>Goodenia lanata</i> | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| <i>Caladenia fuscata</i> | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| <i>Thelymitra</i> sp. | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| <i>Comesperma volubile</i> | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| <i>Bossiaea prostrata</i> | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 |
| <i>Eucalyptus viminalis</i> subsp. <i>viminalis</i> | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| <i>Pultenaea pedunculata</i> | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 4 | 3 |
| <i>Pterostylis</i> sp. | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| <i>Luzula</i> sp. | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| <i>Microlaena stipoides</i> | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 |
| <i>Lomandra longifolia</i> | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| <i>Banksia marginata</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| <i>Lissanthe strigosa</i> var. <i>subulata</i> | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| <i>Oxalis</i> sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

Additional species recorded from test pit area but not included in transect:

Hydrocotyle callicarpa

Appendix 4. Images along transect



Plate 1. Transect – from 0 m mark



Plate 2. Transect – from 30 m mark



Plate 3. Transect – from 50 m mark



Plate 4. Transect – from 80 m mark (back)