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Survey and assessment of the presence of the Water Mouse *Xeromys myoides* at Buffalo Creek, Northern Territory.

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September 2011

Prepared for the Department of Defence Housing Australia.

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Executive Summary

Ecobiological was contracted by the Commonwealth Department of Defence Housing Australia, on instruction from Aurecon Pty Ltd, to undertake a habitat assessment and survey for the Water Mouse on lands adjacent to the proposed Muirhead Residential Subdivision, Lee's Point, Northern Territory.

- No Water Mice were captured during the study;
- This may be indicative of its absence or low population density from the study area, though its future presence within the Buffalo Creek reserve ***cannot be ruled out*** due to the suitability of habitat for this species.
- Captures of the Grassland Melomys and Northern Brown Bandicoot within the littoral zone is consistent with the known information on these species.
- The presence of the Water Mouse within Casuarina Coastal Reserve is considered to be unlikely due to a lack of suitable habitat features.
- Conservation planning for this species in relation to the Muirhead sub-division should assume its possible presence in the habitat areas identified in this report.

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1. Introduction

1.1. Background

Ecobiological was contracted by the Commonwealth Department of Defence Housing Australia, on instruction from Aurecon Pty Ltd, to undertake a habitat assessment and survey for the Water Mouse on lands adjacent to the proposed Muirhead Residential Subdivision, Lee's Point, Northern Territory. The overall program objectives are to implement the EPBC Act approval conditions for the development. These specifically state that any development beyond Muirhead Stage 2 can only take place once a habitat assessment and survey for the Water Mouse (*Xeromys myoides*) have undertaken. The area of Buffalo Creek has been identified as "Likely Habitat" in the Significant Impact Guidelines for the Vulnerable Water Mouse (*Xeromys myoides*) Nationally Listed Threatened Species – EPBC Act Policy Statement 3.20 (CoA 2009a). However, no animal has so far been collected from this location, perhaps reflecting a lack of survey effort (CoA 2009b).

Habitat for the Water Mouse in the Northern Territory is not as well defined as that for Queensland, but it appears to use mangrove forests, saltmarsh, sedgelands, clay pans and freshwater *Melaleuca* wetlands (Redhead and McKean 1975; Magnusson *et al.* 1976; Woinarski *et al.* 2000). Most recent captures of this species were from the floodplain of the Glyde River, in areas of extensively inundated saline clay plains, with low chenier ridges and patches of low chenopod shrubland and saline grassland (Woinarski *et al.* 2000).

While communal nest mounds are typically used by this species in Queensland, only one nest mound has been found in the Northern territory and it is assumed that this species does need mounds for nesting and may use a variety of nesting sites, such as raised littoral islands, ridges, rock outcrops, and low mangrove hollows (CoAb).

The outcomes of the studies and compliance actions must also be reported to the Department of Sustainability, Environment, Water Population and Communities (SEWPAC).

1.2. Study Aims

The approval conditions for the Muirhead Residential Subdivision require a study on the potential habitat usage by the Water Mouse (*Xeromys myoides*) to better define areas that may need additional protection as population levels

increase as a result of the subdivision. This species has been given the conservation status of being "Data Deficient" due to an overall lack of information on range, population size and trends in the Northern Territory and a conservation status of "Vulnerable" under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999.*

The proposed study to offset the potential future impacts of the Muirhead residential subdivision proposal was based on the "Significant Impact Guidelines for the Vulnerable Water Mouse (*Xeromys myoides*) Nationally Listed Threatened Species – Background paper to EPBC Act policy statements 3.20" (CoA 2009b).

In particular, it is noted in the Guidelines for this species that important populations are those showing recent activity, on the limits of the species range or within the reserve system (p.21). Of these criteria, the presence of habitat showing recent activity is the criteria most relevant for the Muirhead proposal, and will therefore be the primary focus of works.

Once potential habitat has been identified it should surveyed according to the methodology identified in "The Guidelines".

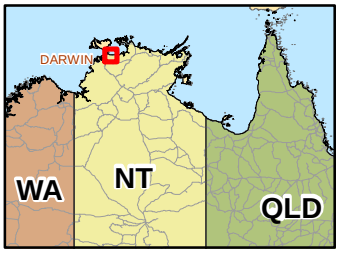
1.3. Study Area and Locality

The study area is located just to the north of Darwin's northern suburbs within the Buffalo Creek and Casuarina Coastal Reserves which lie adjacent to the Muirhead Residential sub-division (**Figure 1** and **Figure 2**).

This is a locality which is dominated by estuaries, coastal mangrove and monsoon woodlands and other developed areas associated with Lee's Point Caravan Park.

Figure 1 Locality

Study site



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Map Projection:
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Data Sources:
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Figure 2 Study Area

Legend

Study Area

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2. Methodologies

The study focussed on the identification and survey of potentially suitable Water Mouse habitat in mangrove areas fringing Buffalo Creek and Casuarina Coastal Reserve Area close to the proposed development area.

The surveying within the mangrove areas is highly tide dependent, and an examination of tides has shown that a favourable tides regime was present during the 15-21 August 2011.

2.1. Habitat assessment

An initial habitat assessment was carried out based on a desktop review of existing known populations and potential habitat areas within the Buffalo Creek and Casuarina Coastal Reserve. This assessment was primarily based on: (a) aerial photograph interpretation and database searches, (b) broad-scale vegetation mapping and rapid assessments of habitat features suitable for the Water Mouse. This process specifically identified ten (10) hectares of potential habitat for follow up survey.

2.2. Site survey

This will be undertaken in two components:

(a) Habitat searches and microhabitat assessment of selected sites; and

(b) Trapping for the Water Mouse at selected sites.

2.2.1. Habitat searches and microhabitat assessment

Once 10 ha of potential habitat were identified, four sites of approximately one hectare each in size were further targeted for more intensive searches and assessment. Daytime search were be carried out in four potential habitat areas, to identify any signs of Water Mouse; mounds, or raised islands in the littoral zone, feeding areas (piles of crab shells), burrow entrance holes or other signs of Water Mouse activity such as tracks. Approximately one to two hours per hectare were dedicated to searching for evidence of nesting mounds. Any mounds or other signs of activity found had their location marked using GPS and were closer inspected for signs based on the features noted in the guidelines (p.24).

In addition, the microhabitat features of each site were quantified using a range of criteria from vegetation structure, ground cover, crab hole density, and other habitat features relevant to the Water Mouse.

2.2.2. Trapping program

Following the identification of likely four sites of potential Water Mouse habitat, these areas were selected for follow-up trapping surveys. Trap-lines were placed in areas of easy access and short travel time to facilitate checking of traps.

Trapping was undertaken using Elliott A traps with 20 placed in each trap-line. These were surveyed for five nights giving a total trapping effort of 400 trap nights for the survey. These were placed in zig-zagged lines commencing at the supra-littoral zone/littoral zone edge and into the littoral zone, which was subject to inundation at one end of the line. Traps were baited with oily sardines which were collected each morning and re-baited with fresh bait in the evenings.

All survey plots were photographed (see Appendix 1).

3. Results

3.1.1. Weather conditions

The weather conditions throughout the survey period were mild to warm, generally ranging around 20°C at night to 30°C during the day. No precipitation was experienced and evaporation levels were low which is typical at this time of year. There was little or no cloud cover throughout the survey period.

Table 1: List of survey or observation dates, times, climatic conditions and site notes.

Survey/ Observation Date	Location	Climatic Conditions	Site Notes
15/08/2011	All sites	T: 16.9-32.0°C; Rain: 0 mm Evap.: 8.6 mm Max wind speed: 35km/hr (E) Cloud cover: 0%.	Site inspection conducted.
16/08/2011	All sites	Temperature: 176.7-30.7°C Rain: 0 mm Evap.: 6.6 mm Max. Wind speed: 30km/hr (NNW) Cloud cover: 0	Survey of sites commenced.
17/08/2011	All sites	T: 17.9-29.3°C; Rain: 0 mm Evap.: 5.6 mm Max. wind speed: 31 km/h (NNW) Cloud cover: 5%.	Survey conducted.
18/08/2011	All sites	T: 20.0-32.7°C; Rain: 0 mm Evap.: 4.8 mm Max wind speed: 48 km/h (ESE) Cloud cover: 0%.	Survey conducted.
19/08/2011	All sites	T: 20.7-31.9°C; Rain: 0 mm Evap.: 6.8 mm Max. wind speed: 48 km/h (ESE) Cloud cover: 0%.	Survey conducted.
20/08/2011	All sites	T: 18.0-31.6°C; Rain: 0 mm Evap.: 8 mm Max. wind speed: 48 km/h (ESE) Cloud cover: 0%.	Survey conducted.

Source: Bureau of Meteorology (http://www.bom.gov.au/climate/dwo/IDCJDW0208.shtml)

3.1.2. Broad habitat mapping

The study area was scoped on the 15th and 16th of August 2011, to give a detailed on-ground assessment of the vegetation communities and habitats of the study area and to identify the most suitable 10 ha of habitat to target for closer survey and assessment.

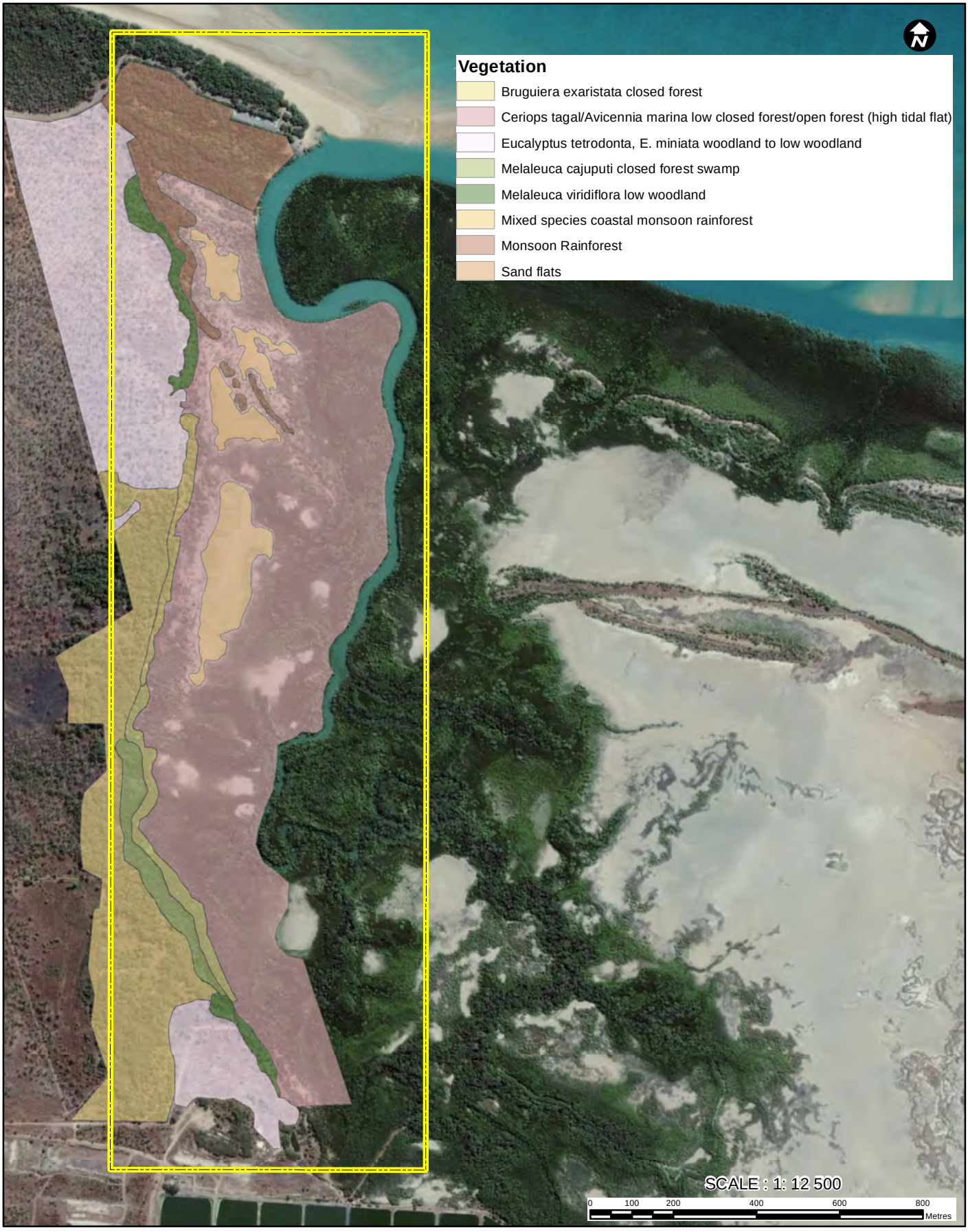

Figure 3 Vegetation Communities of Study Area

Legend

Study Area

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L:\GIS FOLDER\00 CLIENT FILES\360 Aurecon\873\360_873 Fig 3 Vegetation communities of Study Area.mxd

Eight vegetation communities were identified. These are depicted in **Figure 3**:

- *Bruguiera exaristata* closed mangrove forest;
- *Ceriops tagal/Avicennia marina* low closed mangrove forest/open mangrove forest (high tidal flat);
- *Eucalyptus tetrodonta, E. miniata* woodland to low woodland;
- *Melaleuca cajuputi* closed swamp forest;
- *Melaleuca viridiflora* low swamp woodland;
- Mixed species coastal monsoon rainforest;
- Monsoon Rainforest; and
- Sand flats.

Of these communities it was found that the two mangrove communities and the areas associated with the sand flats are the most suitable for the Water Mouse in that:

- They are subject to tidal inundation; and
- They contain a number of habitat features which make them the most suitable the Water Mouse, ie. raised areas, low ridges, clay flats, saline chenopods and grasslands, an abundance of grapsid crabs and mangrove forests.

While a limited amount of potentially suitable habitat can be found in the Casuarina Coastal Reserve, this area was not judged to be as optimal for this species as was Buffalo Creek Reserve because it lacked a number of the above features. As a result, Buffalo Creek was selected for further detailed assessment and investigations.

The area judged to be the most suitable for this species is shown in **Figure 4.**

The thickness of some of the mangrove growth close to the Buffalo Creek inhibited the placement of traps in these areas.

Figure 4 Potential habitat for the Water Mouse

Legend

- Study Area
- Water Mouse Habitat

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3.1.3. Site microhabitat analysis

In order to sample more closely habitats which are most likely to increase the chances of trapping success in the Buffalo Creek area, four sites were selected which displayed features known to be selected by this species as well as to reflect some variation in floristics in the area. Three sites (1, 2 and 3) were located alongside clay flats within *Ceriops tagal/Avicennia marina* mangrove forest and one (4) was located within *Bruguiera exaristata* closed mangrove forest. The survey site habitats are depicted in **Appendix 1**. Their location is given **Figure 5**.

An analysis of the microhabitat of these sites is given below in **Table 2**.

Table 2: Microhabitat analysis of survey sites

Feature	1	2	3	4
Regrowth/old growth	old	old	old	old
Number of habitat layers	2	2	2	3
Ground log abundance	low	mod	mod	high
Hollow abundance	<2/ha	2-5/ha	2-5/ha	2-5/ha
% Bare ground	70	25	90	90
% Litter cover	10	50	0	10
% Rock cover	20	10	0	0
% Herb grass cover	0	15	10	0
Vegetation structure class	mangrove	mangrove	mangrove	mangrove
Dominant tree/shrub height (m)	5	5	5	10
% Overstorey cover	0	0	0	50
% Midstorey cover (upper)	25	10	60	50
% Midstorey cover (lower)	0	50-80	0-80	0
Regeneration occurring	y	y	y	y
Nests present	n	n	n	n
Trunk scratches	n	n	n	n
Invertebrate activity	high	high	high	high
Disturbance	low	low	low	low
Crab hole density/sq m	7	10	8	13
Sediment movement	n	n	n	n
Dams present	n	n	n	n
Manmade wetlands	n	n	n	n
Natural wetlands	y	y	y	y
Perennial stream present	y	y	y	y
Ephemeral waterbodies	y	y	y	n
High ground	y	y	n	n
landscape connectivity	high	high	high	high

The primary difference in the structure of these communities was that Sites 1 and 2 contained areas of raised ground within the littoral zone with considerable rock outcropping. Sites 1, 2 and 3 were located in close proximity to frequently inundated clay pan. Site 4 was located in taller mangrove forest, close to Buffalo Creek, though was relatively featureless and flat.

After extensive habitat searches of the survey sites, no signs of Water Mouse (mounds, fresh mud plastering, mud pathways, musty odours, crab shell piles) were detected at any of the sites.

3.1.4. Trapping results

Trapping results are given below in **Table 3**. No Water Mice were captured during the five day survey period. The Grassland Melomys *Melomys burtoni* was captured at Site 1 and 2, while the Northern Brown Bandicoot *Isoodon macroura* was captured at Site 3. There were no captures at Site 4.

Table 3: Mammals captured at the survey sites

Site	Scientific Name	Common Name	Status	No. of captures
1	Melomys burtoni	Grassland Melomys	LC	3
2	Melomys burtoni	Grassland Melomys	LC	7
3	Isoodon macroura	Northern Brown Bandicoot	LC	2
4	nil			

The Grassland Melomys appeared to be good numbers and when released from the traps they entered crab holes and crevices found in the rocky outcropping at these sites.

An immature Northern Brown Bandicoot was trapped close to the edge of the Paperbark Forest and 100m within the littoral zone. The two captures are likely to be the same individual.

Figure 5 Water Mouse survey sites

Legend

- Study Area
- Water Mouse
- Water Mouse transects

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4. Summary

- The fact that no Water Mice were captured at the sites may be indicative of its absence or low population density from the Buffalo Creek area, though its future presence within the reserve ***cannot be ruled out*** due to the suitability of habitat for this species in the study area.

- To confirm the absence or presence of this species in the study area, further monitoring is recommended. Target habitats would be around the mangrove and saline grassy areas fringing the claypans and the river frontage next to Buffalo Creek.

- Captures of the Grassland Melomys and Northern Brown Bandicoot within the littoral zone is consistent with the known information on these species.

- The presence of the Water Mouse within Casuarina Coastal Reserve is considered to be unlikely due to a lack of suitable habitat features.

- Conservation planning for this species in relation to the Muirhead sub-division should assume its possible presence in the habitat areas identified in this report.

5. References

Commonwealth of Australia(2009a) Significant Impact Guidelines for the Vulnerable Water Mouse (*Xeromys myoides*) Nationally Listed Threatened Species – EPBC Act Policy Statement 3.20

Commonwealth of Australia(2009b) Significant Impact Guidelines for the Vulnerable Water Mouse (*Xeromys myoides*) Nationally Listed Threatened Species – Background paper to EPBC Act Policy Statement 3.20

Magnusson, W.E., G.J.W. Webb & J.A. Taylor (1976). Two new records, a new habitat and a nest description for *Xeromys myoides* Thomas (Rodentia: Muridae). *Australian Wildlife Research* 3: 153-157.

Redhead, T.D. and J.L. McKean (1975). A new record of the False Water Rat, *Xeromys myoides,* from the Northern Territory. *Australian Mammalogy* 1: 347-354.

Woinarski, J.C.Z., K. Brennan, A. Dee, J. Njudumul, P. Guthayguthay & P. Horner (2000). Further records of the False Water Rat *Xeromys myoides* from coastal Northern Territory. *Australian Mammalogy* 21:245-247.

Appendix 1: Photo record of survey sites

Plate 1: Site 1 Macro-habitat

Plate 2: Site 1 Groundstorey

Plate 3: Site 2 Macro-habitat

Plate 4: Site 2 Groundstorey

Plate 5: Site 3 Macro-habitat

Plate 6: Site 3 Groundstorey

Plate 7: Site 4 Macro-habitat

Plate 8: Site 4 Groundstorey

Appendix 2: Mammals caught during survey

Plate 9: Grassland Melomys

Plate 10: Northern Brown Bandicoot

Appendix 3: Contributions and licence details.

Name	Qualifications	Position	Tasks
David Paull	M.Res.Sc	Senior Ecologist	Fields survey, report preparation
Kazz Bowland	B. Env. Sc.	Ecologist	Field survey,
Daniel O'Brien	B. Env. Sc.	Ecologist	Field survey,

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