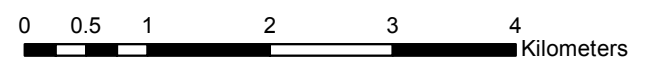


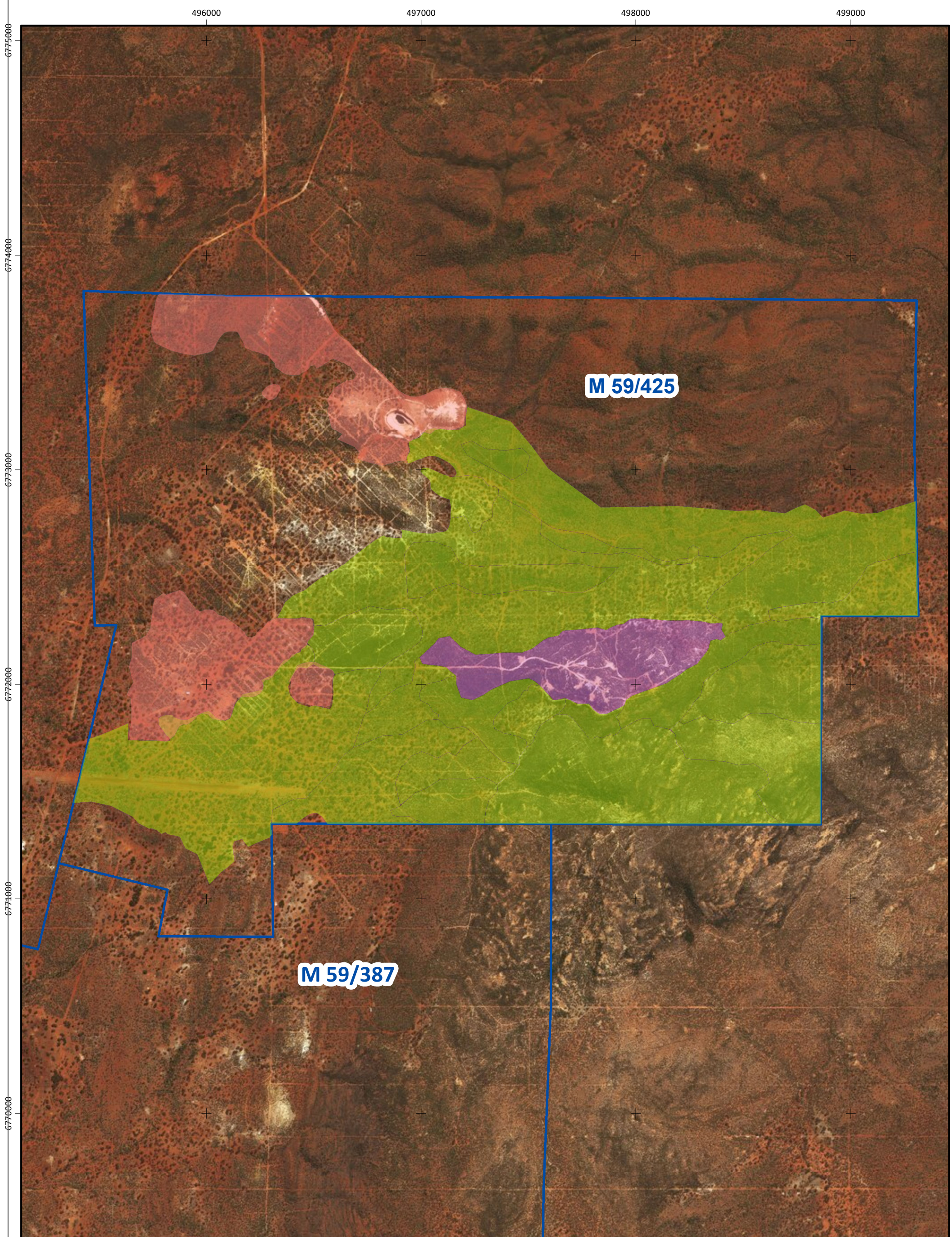
Figure 3-9: Vegetation Communities of the Project Area

Legend

- Community 1    Community 3    Community 6    Community 9
- Community 10    Community 4    Community 7    Tenements
- Community 2    Community 5    Community 8







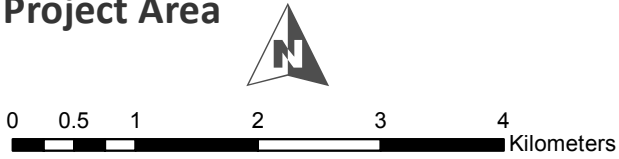
M 59/425

M 59/387

**Legend**

- Condition**
- Disturbance
- Good
- Very good
- Tenements

**Figure 3-10: Vegetation Condition of the Mt Mulgine Project Area**





### 3.2.3 Conservation Significant Vegetation Communities

Vegetation within the Project area does not reflect that of the PECs identified by the PMST and DPaW database searches. Vegetation of the MMP area is not within a BIF community.

### 3.2.4 Conservation Significant Flora

No Threatened Flora of conservation significance, pursuant to Subsection 2 of Section 23F of the WC Act or section 179 of the EPBC Act were identified during the survey in any of the 38 quadrats intensively sampled. Two Priority taxa listed under the WC Act were recorded, *Drummondita fulva* (P1) and *Grevillea scabrida* (P3) within the quadrats sampled. *D. fulva* was recorded within the proposed development footprint. Further survey work to be undertaken following significant rainfall in 2017 will comprise grid pattern foot transect surveys for conservation significant flora in areas that are proposed for clearing and infrastructure construction.

### 3.2.5 Introduced Flora

A total of four weed species were recorded in the Project area; *Bromus rubens*\*, *Silene nocturna*\*, *Solanum nigrum*\* and *Vulpia myuros*\*.

None of these taxa are listed as a Declared Pest or a Weed of National Significance under the *Biosecurity and Agriculture Management Act 2007* (WA) (BAM Act).

## 4 TERRESTRIAL VERTEBRATE FAUNA RESULTS

### 4.1 DESKTOP SURVEY

Based on previous fauna records lodged within 10 km of the Project area, NatureMap indicated that up to 81 fauna species have the potential to occur, comprising of seven invertebrates, 13 reptiles, seven mammals (native and non-native) and 54 birds. The AoLA search indicated the presence of a very similar suite of fauna species.

A search of the EPBC Act list of protected species and threatened ecological communities considered to be MNES indicated 12 fauna species of conservation significance have the potential to occur within 10 km of the Project area. The 11 species comprise nine birds, one invertebrate and one reptile.

A search of DPaW's Threatened and Priority Fauna database identified eight conservation significant fauna previously recorded within a 35 km radius of the Project area, comprising of four birds, one mammal, one invertebrate, and two reptiles.

Conservation significant fauna identified by the searches and their likelihood of occurring in the Project area are discussed in Table 4-1. Species that are specifically dependent on habitats that do not occur in the project have not been included in the table.



**Table 4-1: Conservation significant fauna potentially occurring in the Mt Mulgine Project Area**

Species	Common Name	Cons. Code		Habitat	Likelihood of Occurrence	Habitat Requirements Met	Comments
		Cth	State				
<b>Birds</b>							
<i>Apus pacificus</i>	Fork-tailed Swift	IA		The Fork-tailed Swift occurs on coastal plains and sometimes foothills (DoE, 2016b). They are mostly found over dry or open habitats including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. This species is almost exclusively aerial (DoE, 2016b).	Likely	Yes	This species may forage over the area. However it is an aerial species that is not dependent upon any habitats or landforms likely to be disturbed.
<i>Ardea ibis</i>	Cattle Egret	IA		The heaviest distribution of this species in WA is in the north east, and into the Northern Territory. In the non-breeding season, it can be found throughout most of Australia. It forages on low lying grasslands, pastures and croplands (DoE, 2016b).	Unlikely to occur	No	There is no suitable habitat in the Project area.
<i>Ardea modesta</i> (also known as <i>Ardea alba</i> )	Great Egret, White Egret	IA		The Great Egret occupies a wide variety of wet habitats including freshwater wetlands, dams, flooded pastures, estuarine mudflats, mangroves and reefs (Morcombe, 2003). The species is also known to visit shallows of rivers, sewage ponds and irrigation areas (Pizzey & Knight, 2012).	Unlikely to occur	No	There is no suitable habitat in the Project area.
<i>Falco peregrinus</i>	Peregrine Falcon		OS	A well-known falcon, the Peregrine inhabits a vast array of environs in Australia. Usually uncommon and migratory (Pizzey & Knight, 2012). This species lays its eggs in recesses of cliff faces or large abandoned nests.	Unlikely to occur	Yes	Individuals would forage over the site as part of a broader foraging territory. However, nesting is unlikely as there are no suitable cliff faces upon which this species prefers to nest.
<i>Leipoa ocellata</i>	Malleefowl	VU	VU	Malleefowl habitat requirements are quite specific. The species requires unburnt mallee and woodland with low scrub and abundant litter to use in nesting mounds (Morcombe,	Highly Likely	Yes	Suitable habitat occurs within the Project area an inactive mounds have been recorded. A single footprint was identified during the 2016 APM survey.



Species	Common Name	Cons. Code		Habitat	Likelihood of Occurrence	Habitat Requirements Met	Comments
		Cth	State				
				2003).			
<i>Merops ornatus</i>	Rainbow Bee-eater	IA	IA	The Rainbow Bee-eater is a common species which occupies numerous habitats including open woodlands with sandy loamy soil, sand ridges, sandpits, riverbanks, road cuttings, beaches, dunes, cliffs, mangroves and rainforests. The Rainbow Bee-eater avoids heavy forest that would hinder the pursuit of its insect prey (Morcombe, 2003).	Highly Likely	Yes	This species is ubiquitous throughout the region and can often be found foraging around woodlands where it's primary food source are most abundant. Disturbed sites around mines also provide ideal nesting opportunities where adults can excavate burrows in the disturbed soiled banked up by machinery.
<i>Motacilla cinerea</i>	Grey Wagtail	IA		The Grey Wagtail prefers the banks and rocks of fast-running fresh water habitats. It occurs in open and forested areas but can be found anywhere during migration (Johnstone and Storr, 2004).	Unlikely to occur	No	There is no fast-running fresh water habitat available in the Project area that would flow for a sufficient period to encourage occupation of adjacent vegetation by this species.
<b>Invertebrates</b>							
<i>Idiosoma nigrum</i>	Shield-backed Trapdoor Spider	VU	VU	Populations in the Midwest are found in rocky habitats, mostly areas with increased moisture retention properties like gullies and drainage lines on southern facing slopes. In the arid Midwest they are associated with <i>Acacia</i> shrubland (DoE, 2016b)	Highly likely	Yes	Several burrows have been recorded in the Project area.
<b>Reptiles</b>							
<i>Egernia stokesii badia</i>	Western Spiny-tailed Skink	EN	VU	Records of the Western Spiny-tailed Skink in the Murchison region are from small, isolated stands of granite containing suitable habitat to larger, more extensive clusters of rock (DoE, 2016b). Family groups are also known to occupy hollow log piles in Salmon Gum woodlands.	Possible	Yes	The Project area contains some small isolated granite outcrops and a number of log piles within one of the vegetation units.



Species	Common Name	Cons. Code		Habitat	Likelihood of Occurrence	Habitat Requirements Met	Comments
		Cth	State				
<i>Cyclodomorphus branchialis</i>	Slender Bluetonge		VU	A ground dwelling slow moving lizard that occupies Triodia grasses, leaf litter and fallen timber.	Likely	Yes	Isolated areas supporting the key habitat elements for this species occur through the project area and the local area and region.
<b>Mammals</b>							
<i>Macropus irma</i>	Western Brush Wallaby		P4	This species favours forest or woodland, mallee and heath in the wheatbelt and forages in low open patches close to refuge.	Likely	Yes	This is a relatively large and agile macropod that is capable of moving away from disturbance. The species is of conservation significance due primarily to loss of habitat to extensive pastoralism.



## 4.2 FIELD SURVEY

### 4.2.1 Western Spiny-tailed Skink

Targeted saturation trapping of habitat likely to support the Western Spiny-tailed Skink failed to result in the capture of this species. No secondary evidence (latrines) were discovered in areas of suitable habitat that were searched for this species and no images were captured using remote sensing cameras.

Nevertheless, as the species is known to occur in the region, an area of ideal habitat comprising mature fallen Eucalypts has been identified as an area of no impact, protected from clearing and construction (Figure 4-1).

### 4.2.2 Malleefowl

Extensive foot transects across the site failed to reveal any active malleefowl mounds within the Project area. Two mounds had been mapped as active in 2012 by another party; one inside the project impact footprint and one at nearby Bobby McGee waste dump less than 3 km to the north of the Project. During the field survey both of these mounds were located to check their status and both were inactive. The only other sign of nesting activity was an inactive mound located at the base of the proposed central southern waste landform which was in such poor condition that its location was not mapped.

One short trail of malleefowl tracks were located on the northern edge of the airstrip adjacent to where much of the infrastructure is proposed (Figure 4-2). The habitat in this area (open woodland) was not typical of foraging habitat for this species and intensive searching around the tracks failed to reveal any signs of foraging.

No specific evidence of foraging was located during the field survey despite the intensity of searching in dense shrubland vegetation.

### 4.2.3 Shield-backed Trapdoor Spider

Searches recorded a total of 24 active SBTS burrows in the Project area (Figure 4-3). Calculating burrow density per unit area based on the standardised search technique employed for the present survey determined that burrow density across the site averaged at approximately 6.25 burrows per hectare in suitable habitat (Figure 4-3).

The area mapped as suitable habitat in Figure 4-3 that has been designated as a 'no disturbance area' supported a higher density of burrows per unit area: 14.3 burrows per hectare.



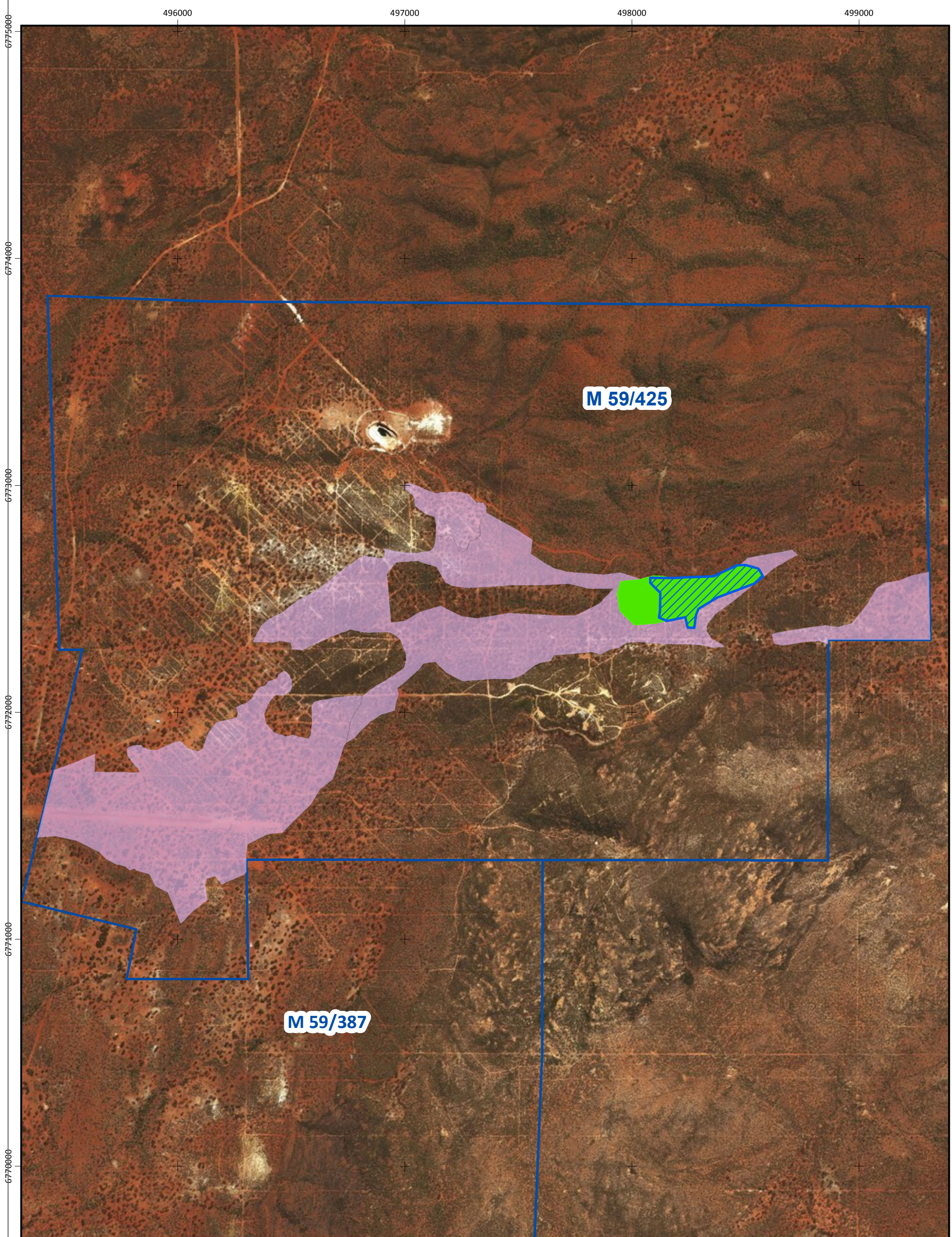
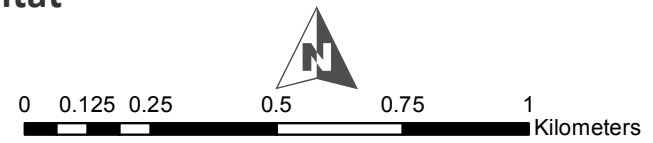


Figure 4-1: Western Spiny-tailed Skink Habitat

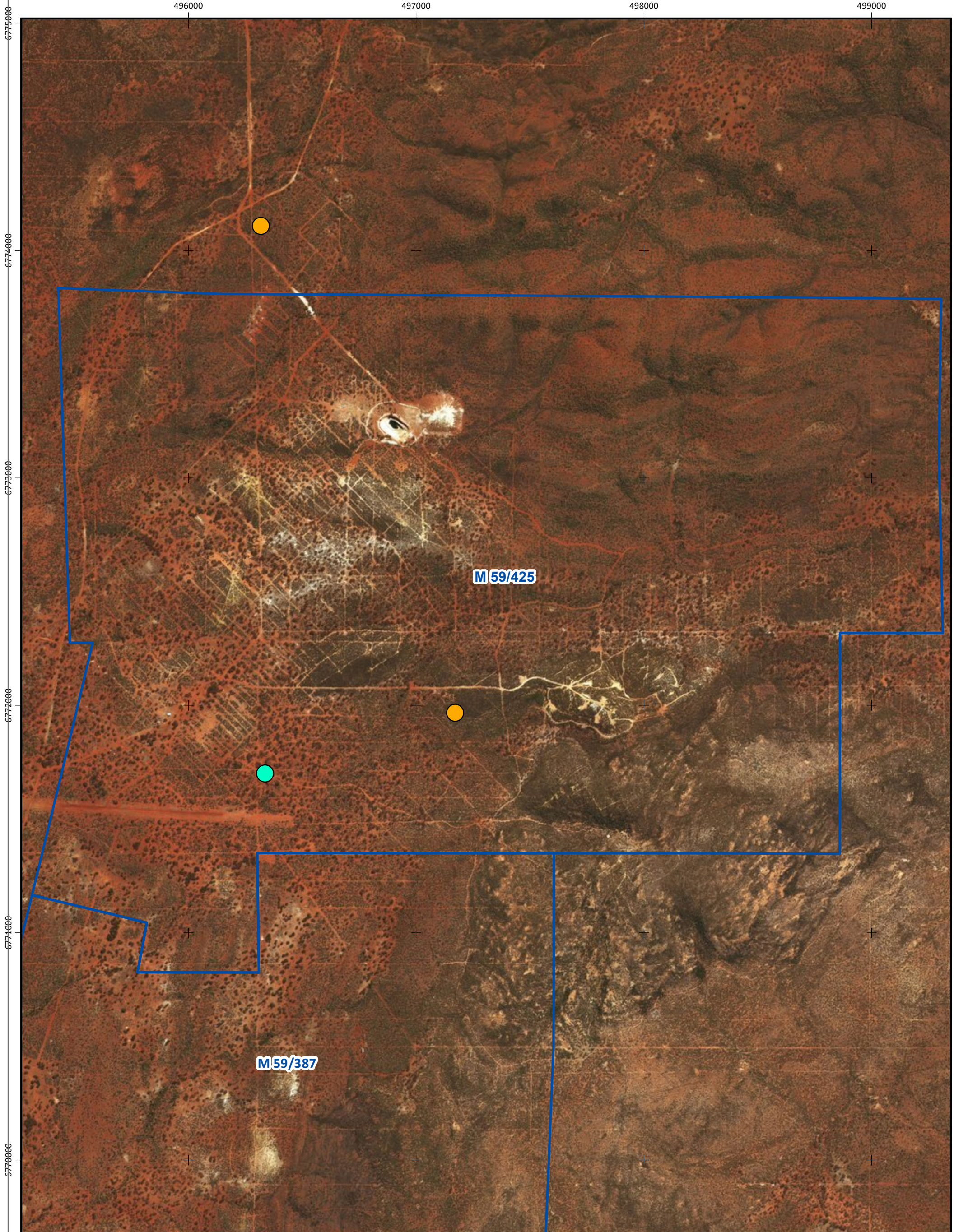
Legend

- Suitable habitat
- Marginal habitat
- No disturbance
- Tenements



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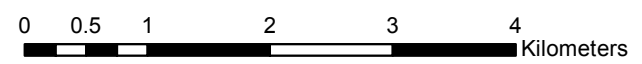




**Legend**

- Record Type**
- Tenements
- Mound
- Tracks

**Figure 4-2: Malleefowl Records in the Project Area**





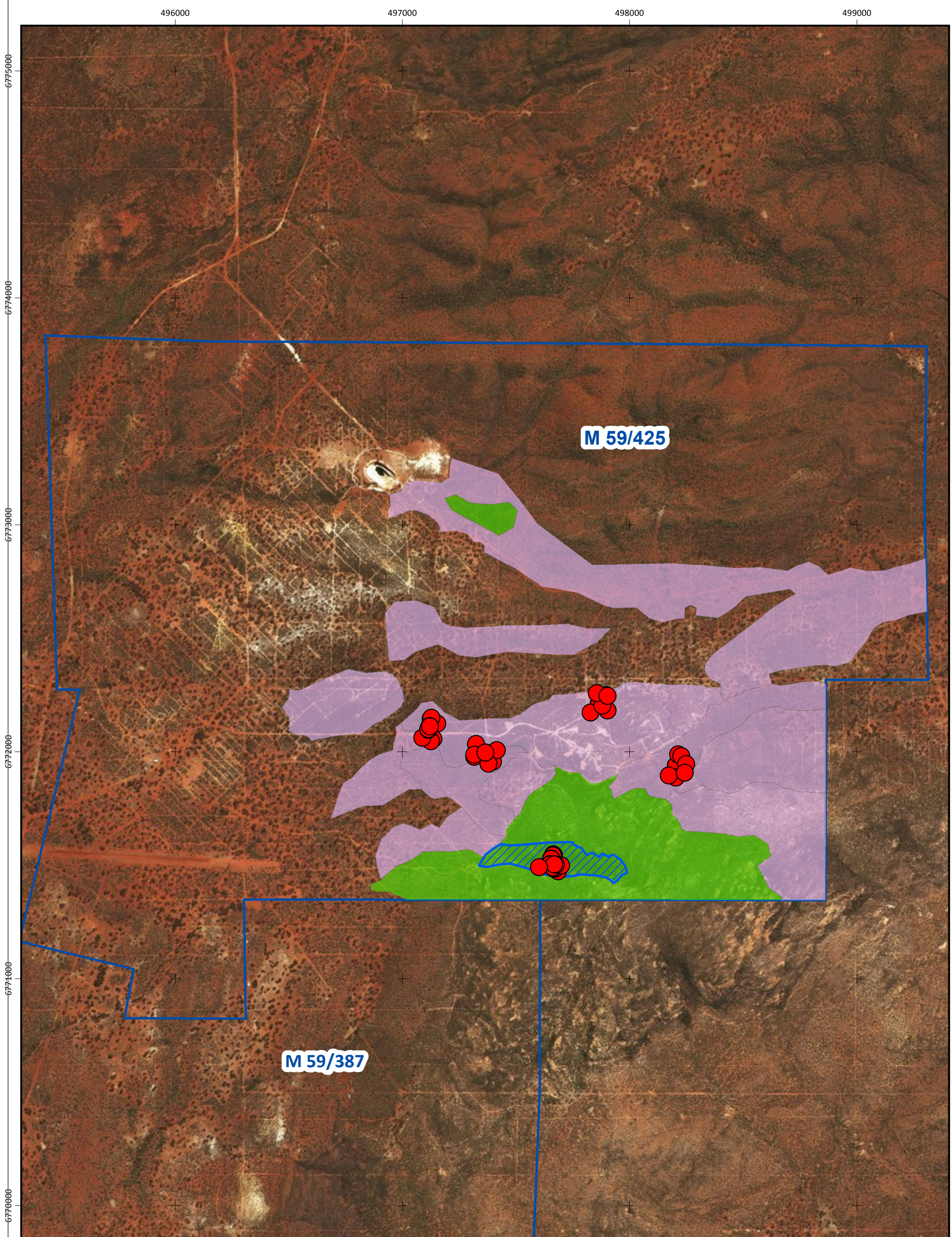
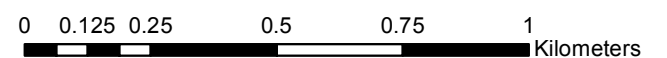


Figure 4-3: Shield-backed Trapdoor Spider Habitat and Active Burrows

Legend

- Active spider burrow
- Marginal habitat
- Tenements
- Suitable habitat
- No disturbance





#### 4.2.4 Fauna Habitats

Fauna assemblages are closely aligned with available habitats. The habitat types chosen represent a scale based on the small size of the Project area in relation to the surrounding landscape and largely reflect landform, soil type and vegetation communities.

A total of four fauna habitats were identified during the survey with variation at the highest level arising from the dichotomy of the overstorey vegetation: tall shrubland vs *Eucalyptus* woodland.

The majority of the Project area was dominated by tall shrublands of *Acacia* and *Allocasuarina* (shown on Figure 4-4 as *Acacia ramulosa* woodland and *Allocasuarina dielsiana* open woodland). However, some notable tracts of *Eucalyptus* woodland occurred in the lowland valley running east west on the northern side of Mt Mulgine (shown on Figure 4-4 as *Eucalyptus* woodland).

Soil types, as they relate to fauna, were highly variable due, not only to natural process, but also historical disturbance where drilling and benching had resulted in large amount of overland accretion of loose soil as it moves downslope. In the case of the *Eucalyptus* woodland soil types varied on a small scale being, for the most part sandy loam, but also shallow and rocky in areas close to drainage lines or surface expressions of rock. The areas of tall shrubland had an equally variable soil strata depending on where (rises or depressions) the shrubland was growing, further complicated by whether or not that area had been historically disturbed.

As a consequence the site hosts a diversity of fauna across a mosaic of micro habitats. For instance arboreal geckos that refuge under bark, such as *Gehyra variegata* (the Tree Dtella) comprise different species than those arboreal species that occupy tall shrubland, such as *Strophurus strophurus* (the Western Spiny-tailed Gecko). Whereas the common fossorial gecko *Heteronotia binoei* (Bynoe's Gecko) can be found under stumps and fallen litter and logs in both habitats. The dragons *Ctenophorus reticulatus* (Western Netted Dragon) *Ctenophorus scutulatus* (Lozenge-marked Dragon) both prefer open areas for foraging and retreat but require loamy soil in which to burrow meaning they will occupy some of the woodland and shrubland areas, but not all if the soil type is unsuitable.

Litter and detritus that collect around the base of the Eucalypt species tends to attract fossorial species such as the *Brachyurophis semifasciatus* (Southern Shovel-nosed Snake), *Simoselaps bertholdi* (Jan's Banded Snake), *Lerista gerrardii*, *Lerista kingi*, *Menetia greyii* and *Morethia butleri*. However, only the most common of these taxa are turned up in the less humus rich litter and detritus that is typically found under the *Acacia* and *Allocasuarina* shrubland even if the soil structure is similar.

*Egernia depressa* (Southern Pygmy Spiny-tailed Skink) and the Western Spiny-tailed Skink are as easily located in hollow logs or crevices among rocky outcrops and are one of only a few species that are both saxatorial and semi arboreal, showing the value of multiple major habitat types to single species.

Larger species such as the perentie and the Spotted Mulga Snake forage broadly across the site and would utilise most of the fauna habitats available.

The vegetation alliances and associations have been assessed and condensed into four major fauna habitat types. The impact of the current proposed clearing and construction footprint on these communities and their representation in the Project area is presented in Table 4-2.

#### Community 1/3

*Eucalyptus* open woodland on mixed shrubland over *Austrostipa variabilis* and/or *Austrostipa elegantissima* grassland over sandy loam soil.



**Community 2/5/6**

Mixed shrubland over *Austrostipa scabra* grassland over sandy loam soil.

**Community 4/9**

*Acacia ramulosa* and or *Acacia latiora* woodland over mixed shrubland over sandy loam soils and/or *Eriachne benthamii* grass with exposed aggregate.

**Community 7/8/10**

*Allocasuarina dielsiana* and/or *Allocasuarina acutivalvis* subsp. *prinsepiana* open woodland over mixed shrubland, and in some cases *Eriachne pulchella* low open grassland over sandy loam soils with large coarse fragments.

**Table 4-2: Proposed Disturbance to Fauna Habitat in the Project Area**

Habitat	Represented in the Project Area (ha)	Represented in Proposed Disturbance Footprint (ha)	Area Remaining (ha)
<b>Community 1/3</b> <i>Eucalyptus</i> open woodland on mixed shrubland over <i>Austrostipa variabilis</i> and/or <i>Austrostipa elegantissima</i> grassland over sandy loam soil.	155.72	33.56	122.16
<b>Community 2/5/6</b> Mixed shrubland over <i>Austrostipa scabra</i> grassland over sandy loam soil.	55.03	25.90	29.13
<b>Community 4/9</b> <i>Acacia ramulosa</i> and or <i>Acacia latiora</i> woodland over mixed shrubland over sandy loam soils and/or <i>Eriachne benthamii</i> grass with exposed aggregate.	187.90	45.97	141.93
<b>Community 7/8/10</b> <i>Allocasuarina dielsiana</i> and/or <i>Allocasuarina acutivalvis</i> subsp. <i>prinsepiana</i> open woodland over mixed shrubland, and in some cases <i>Eriachne pulchella</i> low open grassland over sandy loam soils with large coarse fragments.	67.36	5.64	61.72
<b>Total</b>	<b>466.01</b>	<b>111.07</b>	<b>354.94</b>