

Memorandum

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| To | Andrew Stannard | From | Aurecon C/o Jane Stark |
| Copy | | Reference | 225678 |
| Date | 2 July 2012 | Pages (including this page) | 25 |
| Subject | Roma Ecological Assessment – Addendum to Lot 5 WT217 Report | | |

Mr Stannard

This memorandum relates to the ground-truthing of the proposed development areas shown in Figure 1.1 and documents the results of ecological investigations on the following areas in the Fairview gas fields:

- Area 50a on Lot 5 WT217
- Area 51 on Lot 5 WT217
- Area 52 on Lot 5 WT217
- Area 53 on Lot 5 WT217
- Stockpile/Laydown 3 on Lot 5 WT217

These ecological investigations were undertaken from 5 June 2012 to 7 June 2012 by two Aurecon ecologists (Sandra Walters and Kellie Butler).

A report specific to proposed development areas within Lot 5 WT217 has been previously prepared and submitted to Santos (Ecological Assessment Report – Lot 5 WT217; Santos Document Reference 0020-GLNG-4-1.3-0030-03 and associated addendums).

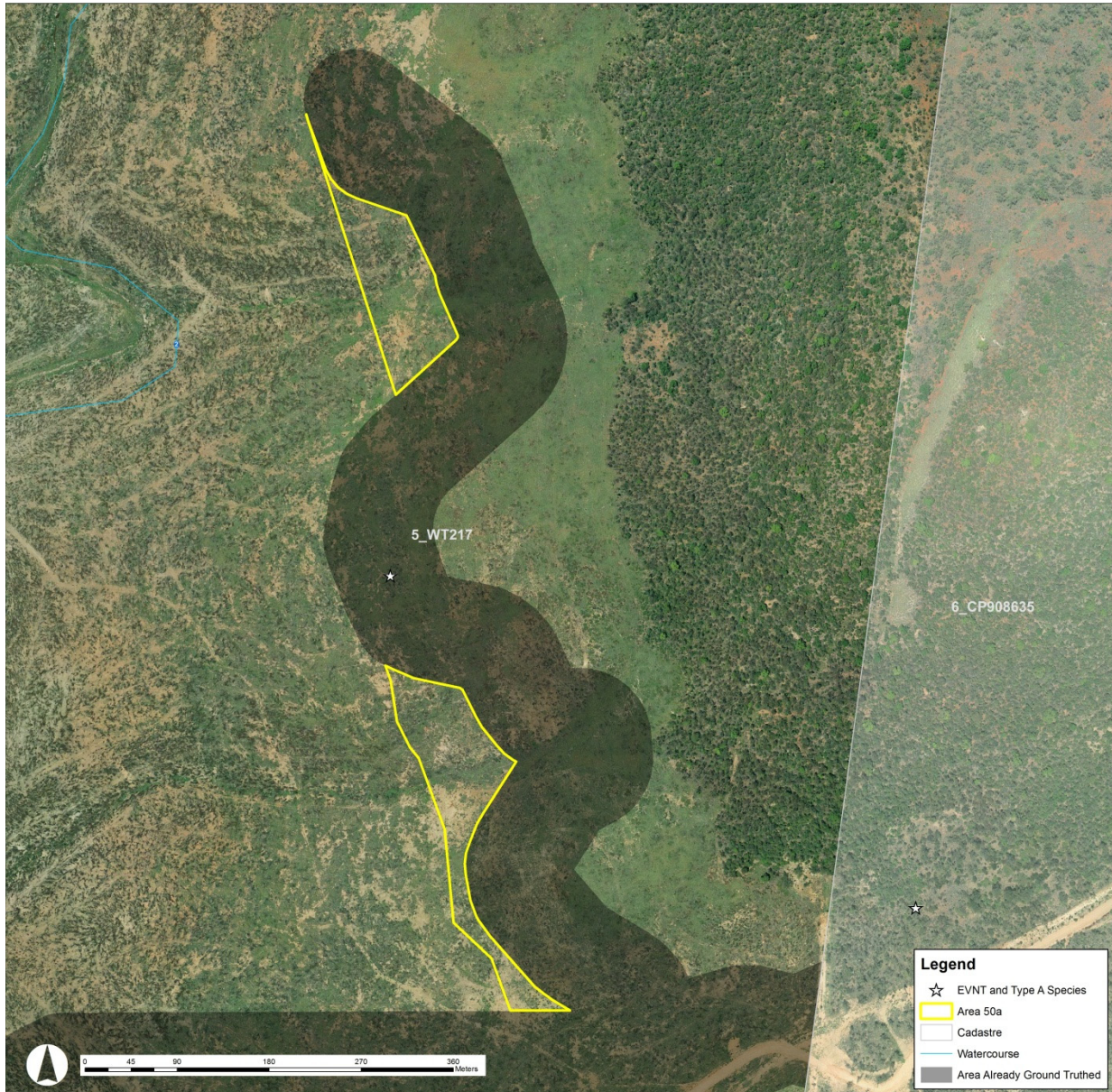
This memorandum should be considered as an addendum to the report listed above. This memorandum is specific to the ecology of Areas 50a, 51, 52, 53 and Stockpile/Laydown 3, as shown in Figure 1.1. For additional ecological information related to the proposed development that is in addition to that covered by this report, please refer to the appropriate Lot-specific report.

Ecological Assessment

1 Area 50a

General

The proposed development area within Area 50a is situated within the southern portion of Lot 5 WT217. This area has been previously cleared and is currently being used for cattle grazing. Area 50a is also disturbed as a result of the adjacent infrastructure (eg access roads and existing wells) (refer Figure 1.1). During site investigations, it was noted that minor erosion occurs across the site, most likely due to cattle movements and overland flow.



No Regional Ecosystems (RE) are mapped within Area 50a under the Department of Natural Resources and Mines (DNRM) certified mapping. A 'Category B' Environmentally Sensitive Area (ESA) is located approximately 150 m east of the site (refer Figure 1.1). This ESA is due to the presence of mapped 'remnant' 'endangered' vegetation.

A mapped 'stream order 2' 'watercourse' is located approximately 170 m west of Area 50a which flows north to south.

The landform in the southern portion of Area 50a has a gentle slope with a western aspect; and in the northern portion it has a gentle slope with an easterly aspect. Area 50a has sandy-clay soils present with sandstone rock cover.



Legend

- Proposed Development Areas
- Corridors - Ground Truth
- Amended Regional Ecosystem (Biodiversity Status)**
- Endangered - Dominant
- Endangered - Sub-dominant
- Of Concern - Dominant
- Of Concern - Sub-dominant
- Not of Concern
- Watercourse
- Cadastre

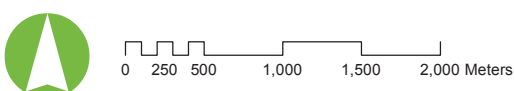
Note: No ESA area or ESA buffers have been included on this figure.

Source:
Cadastral: DERM, 2011.
Regional Ecosystems: Version 6.1, The State of Queensland (Department of Environment and Resource Management), Sept 2011. As amended by Aurecon, 2011.

Date: 28/06/2012

Version: 1

Map by: JPC P:\GIS\Projects\215648_Fairview_Eco_Assessment\Data\Working\Loc_Callaghan\5_WT217\Lot 5 WT217 overview1.mxd 28/06/2012 10:16



Job No: 225678
Coordinate system: GDA_1994_MGA_Zone_55

Santos Upstream Ecological Assessment

Figure 1.1: Proposed development areas on Lot 5 WT217

Floristics

The proposed development areas within Area 50a have been cleared for agriculture, mainly for grazing livestock. As such, the area is disturbed with no canopy layer present. The shrub layer was approximately 1 to 5 m in height with approximately 40% vegetation cover. The shrub layer was co-dominated by native species, including *Acacia decora* (Pretty Wattle) and *Acacia salicina* (Sally Wattle). Other species occurring commonly throughout the area include *Eremophila mitchellii* (False Sandalwood), *Alectryon diversifolius* (Scrub Boonaree), *Geijera parviflora* (Wilga), *Dodonaea viscosa* (Sticky Hop-bush), *Senna artemisioides* (Senna), juvenile *Eucalyptus melanophloia* (Silver-leaved Ironbark), *Maireana microphylla* (Small-leaf Bluebush), *Acacia leiocalyx* (Black Wattle) and *Citrus glauca* (Lime Bush).

The ground layer has approximately 85% vegetation cover and was dominated by the exotic pasture species, *Pennisetum ciliare* (Buffel Grass) in the northern portion of the site and co-dominated by *Chloris pectinata* (Comb Chloris) and *Themeda triandra* (Kangaroo Grass) in the southern portion. Other ground cover species observed commonly include *Verbena tenuisecta* (Mayne's Curse), *Aristida jerichoensis* (Jericho Wiregrass), *Bothriochloa pertusa* (Indian Couch), *Cymbopogon refractus* (Barbwire Grass), *Dichanthium sericeum* (Queensland Blue Grass) *Conyza bonariensis* (Fleabane), *Cynodon dactylon* (Green Couch) and *Sida subspicata* (Queensland Hemp). A 'Class 2 pest' declared under the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act), *Opuntia tomentosa* (Velvety Tree Pear), was also observed in the ground layer. A full list of species recorded is outlined in Attachment 1 at the end of this document.

No 'Type A restricted plant' species listed under the provisions of the *Nature Conservation Act 1992* (NC Act) were recorded within Area 50a.

No species of conservation significance (ie 'endangered', 'vulnerable' and 'near threatened' species under the provisions of the NC Act or 'critically endangered', 'endangered' and 'vulnerable' species under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* [EPBC Act]) were recorded within Area 50a.

Habitat values

Eighteen fauna species were observed during site investigations, comprising 17 birds and one mammal. Traces of two additional mammals were also observed in Area 50a (refer Table 1.1).

Table 1.1 Fauna species observed in Area 50a

| Scientific Name | Common Name | Comment |
|--------------------------------|---------------------------|----------------------|
| <i>Aepyprymnus rufescens</i> | Rufous Bettong | Observed tracks only |
| <i>Cacatua galerita</i> | Sulphur-crested Cockatoo | |
| <i>Calyptorhynchus banksii</i> | Red-tailed Black-cockatoo | |
| <i>Corvus orru</i> | Torresian Crow | |
| <i>Cracticus nigrogularis</i> | Pied Butcherbird | |
| <i>Cracticus tibicen</i> | Australian Magpie | |
| <i>Cracticus torquatus</i> | Grey Butcherbird | |
| <i>Egretta novaehollandiae</i> | White-faced Heron | |
| <i>Falco cenchroides</i> | Nankeen Kestrel | |
| <i>Macropus giganteus</i> | Eastern Grey Kangaroo | Observed scats only |
| <i>Macropus robustus</i> | Common Wallaroo | |

| Scientific Name | Common Name | Comment |
|---------------------------------|-----------------------|---------|
| <i>Malurus melanocephalus</i> | Red-backed Fairy-wren | |
| <i>Meliphaga lewinii</i> | Lewin's Honeyeater | |
| <i>Pardalotus striatus</i> | Striated Pardalote | |
| <i>Platycercus adscitus</i> | Pale-headed Rosella | |
| <i>Rhipidura albiscapa</i> | Grey Fantail | |
| <i>Rhipidura leucophrys</i> | Willie Wagtail | |
| <i>Smicronis brevirostris</i> | Weebill | |
| <i>Strepera graculina</i> | Pied Currawong | |
| <i>Trichoglossus haematodus</i> | Rainbow Lorikeet | |

Area 50a has been cleared historically, with no canopy cover, hollows or fissured tree bark suitable for shelter, perching and foraging resources. Dense ground cover vegetation (ie grassy tussocks), minor leaf litter, minor woody debris (ie fallen/felled timber) and rocky crevices (only present in the northern portion of the site) may provide shelter and foraging resources for small mammals and reptiles. Overall, the fauna habitat value for Area 50a is considered low.

Dense vegetation analogous to 'endangered' RE 11.9.4a is located approximately 150 m east of the site. Although this vegetation is located outside of Area 50a, highly mobile species such as birds may fly over the site in transit. A finch's nest was also observed in a *Citrus glauca* located just outside of the proposed development area.

No conservation significant fauna species were recorded within the proposed development area.

2 Area 51

General

The proposed development area within Area 51 is located in the central portion of Lot 5 WT217. This area has been previously cleared for cattle grazing purposes. Area 51 is also disturbed as a result of the adjacent infrastructure (eg access roads and existing wells) (refer Photo 2.1).



No REs are mapped within Area 51 under the DNRM certified mapping. A 'Category C' ESA is located approximately 500 m south-east of the site (refer Figure 1.1). This ESA is due to the presence of mapped 'essential habitat' under the *Vegetation Management Act 1999* (VM Act) for *Acacia spania* (Western Rosewood) and *Melaleuca irbyana* (Swamp Tea-tree). These species are listed as 'near threatened' under the provisions of the NC Act, however were not observed on the site during investigations.

A mapped 'stream order 1' 'watercourse' is located approximately 670 m south-west of Area 51 which flows north to south.

The landform of Area 51 was flat with medium brown sandy-clay soils present.



Photo 2.1 Photo looking north-west within Area 51

Floristics

The canopy layer within Area 51 was approximately 8 to 12 m in height, with less than 5% vegetation cover. This layer was dominated by *Acacia leiocalyx*, with *Corymbia clarksoniana* (Clarkson's Bloodwood), *Acacia salicina* and *Eucalyptus melanophloia* X *E. populneus* also occurring.

The shrub layer was approximately 1 to 5 m in height, with approximately 15% vegetation cover and was dominated by *Alphitonia excelsa* (Red Ash). The shrub layer also consisted of *Alstonia constricta* (Bitter Bark), *Lysicarpus angustifolium* (Budgeroo), *Maireana microphylla*, *Citrus glauca*, *Grewia latifolia* (Dysentery Plant) and *Eremophila deserti* (Turkey Bush). A 'Class 2 pest' declared under the LP Act, *Opuntia tomentosa*, was also observed in the shrub layer.

The dense ground layer had approximately 90% vegetation cover and was dominated by the introduced species, *Melinis repens* (Red Natal). Common species occurring within the ground layer at a lesser density include *Panicum effusum* (Inquisitive Grass), *Pennisetum ciliare*, *Chloris truncata* (Windmill Grass), *Aristida caput-medusae* (Curly Head Wire Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Sida subspicata*, *Sida corrugata* (Corrugated Sida), *Conyza bonariensis*, *Podolepis jaceoides* (Showy Copper Wire Daisy) and *Xerochrysum bracteatum* (Everlasting Daisy). A full list of species recorded at the sites is outlined in Attachment 1.

No 'Type A restricted plant' species under the provisions of the NC Act were recorded within Area 51.

No species of conservation significance were observed within Area 51.

Habitat values

Ten common bird species were observed during site investigations. Traces of one additional mammal was also noted (refer Table 2.2).

Table 2.1 Fauna species observed in Area 51

| Scientific Name | Common Name | Comment |
|-------------------------------|-----------------------|---------------------|
| <i>Corvus orru</i> | Torresian Crow | |
| <i>Falco cenchroides</i> | Nankeen Kestrel | |
| <i>Lichmera indistincta</i> | Brown Honeyeater | |
| <i>Macropus giganteus</i> | Eastern Grey Kangaroo | Observed scats only |
| <i>Malurus melanocephalus</i> | Red-backed Fairy-wren | |
| <i>Meliphaga lewinii</i> | Lewin's Honeyeater | |
| <i>Pardalotus striatus</i> | Striated Pardalote | |
| <i>Platycercus adscitus</i> | Pale-headed Rosella | |
| <i>Rhipidura albiscapa</i> | Grey Fantail | |
| <i>Smicronis brevirostris</i> | Weebill | |
| <i>Strepera graculina</i> | Pied Currawong | |

Area 51 contains the following habitat resources:

- Limited canopy cover suitable for shelter, foraging and perching
- Dense groundcover vegetation (ie grassy tussocks)
- Limited woody debris (ie fallen/felled timber, including hollow-bearing logs)
- Limited leaf litter

The proposed development area has been cleared historically, with only a sparse canopy layer suitable for perching and foraging resources. Dense ground cover, limited woody debris and limited leaf litter may also provide shelter throughout the proposed development areas. Two bird's nests were observed in a single *Citrus glauca* and are described in Table 2.2. However, the species was unable to be identified due to the absence of the birds in the nests. Overall, the fauna habitat value for Area 51 is considered low.

Table 2.2 Bird's nests observed in Area 51

| Bird Nest | Host Tree | Coordinates | Comments |
|-----------|----------------------|-----------------|-----------------------------|
| Finch | <i>Citrus glauca</i> | 692670, 7162651 | Active nest containing eggs |
| Finch | | | Inactive nest |

No conservation significant fauna species were recorded within the proposed development area.

3 Area 52

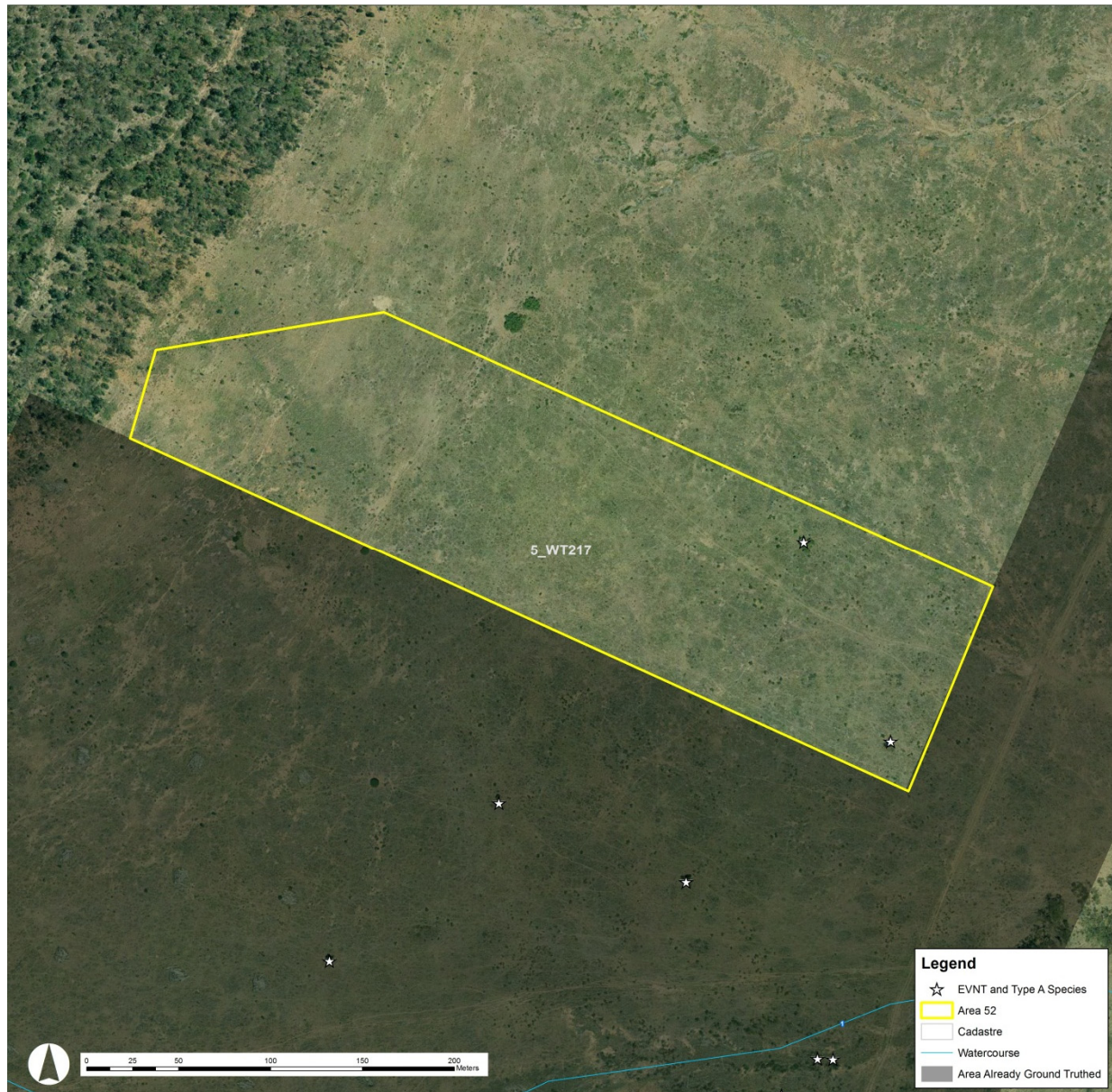
General

The proposed development area within Area 52 is located within the central portion of Lot 5 WT217. This area has been previously cleared for cattle grazing purposes. Area 52 is also disturbed as a result of the adjacent infrastructure (eg access roads) (refer Figure 1.1).

No REs are mapped within Area 52 under the DNRM certified mapping. Vegetation located adjacent to the north-western border of the site is mapped as 'no concern at present' RE 11.10.1/11.10.13a under the DNRM RE mapping. A 'Category C' ESA is located approximately 1.4 km south of the site. This ESA is due to the presence of mapped 'essential habitat' under the VM Act for *Acacia spania* and *Melaleuca irbyana*, listed as 'near threatened' under the provisions of the NC Act (refer Figure 1.1).

A mapped 'stream order 1' 'watercourse' is located approximately 110 m south of Area 52 which flows west to east.

The landform of Area 52 is a gradual slope with a south-eastern aspect. Sandy-clay soils are present.



Floristics

Area 52 has been cleared for agriculture, mainly for grazing livestock. As such, the area is disturbed with no canopy layer present. The shrub layer was approximately 1 to 5 m in height with approximately 30% vegetation cover. The shrub layer was dominated by juvenile *Eucalyptus populneus*, with *Maireana microphylla*, *Grevillea striata* (Beefwood), *Dodonaea viscosa* and *Eremophila mitchellii* occurring commonly. Other species occurring at a lesser density include *Alectryon diversifolius*, *Alectryon oleifolius* (Boonaree), *Psyrax oleifolia* (Hat Stand), juvenile *Eucalyptus melanophloia*, *Acacia leiocalyx*, *Atalaya hemiglauca* (Whitewood), *Allocasuarina luehmannii* (Bull Oak), *Myoporum acuminatum* (Boobiolla) and *Petalostigma pubescens* (Quinine). A 'Class 2 pest' declared under the LP Act, *Opuntia stricta* (Prickly Pear), was also observed in the shrub layer.

The dense ground layer has approximately 95% cover over the majority of the site and approximately 80% cover in the northern portion, due to some patches of bare ground. The ground layer was dominated by the native species, *Bothriochloa bladhii* (Forest Blue Grass). Other ground layer species observed commonly include *Pennisetum ciliare*, *Verbena tenuisecta*, *Chloris pectinata*, *Themeda triandra*, *Chrysocephalum apiculatum* (Yellow Buttons), *Sida corrugata*, *Sida subspicata*, *Cirsium vulgare* (Spear Thistle), *Cymbopogon refractus*, *Eragrostis brownii* (Brown's Lovegrass), *Bothriochloa decipiens* (Pitted Blue Grass), *Panicum decompositum* (Hairy Panic) and *Sporobolus creber* (Western Rat's Tail Grass). A 'Class 2 pest' declared under the LP Act, *Opuntia tomentosa*, was also observed in the ground layer. A full list of species recorded is outlined in Attachment 1.

No 'Type A restricted plant' species under the provisions of the NC Act were recorded within Area 52.

No flora species of conservation significance were recorded within Area 52.

Habitat values

Twenty one bird species were observed during the site investigation in Area 52 (refer Table 3.1).

Table 3.1 Fauna species observed in Area 52

| Scientific Name | Common Name |
|---------------------------------|---------------------------|
| <i>Alisterus scapularis</i> | Australian King-Parrot |
| <i>Anthus novaeseelandiae</i> | Australasian Pipit |
| <i>Cisticola exilis</i> | Golden-headed Cisticola |
| <i>Coracina novaehollandiae</i> | Black-faced Cuckoo-shrike |
| <i>Corvus orru</i> | Torresian Crow |
| <i>Cracticus nigrogularis</i> | Pied Butcherbird |
| <i>Cracticus tibicen</i> | Australian Magpie |
| <i>Elanus axillaris</i> | Black-shouldered Kite |
| <i>Eolophus roseicapilla</i> | Galah |
| <i>Falco cenchroides</i> | Nankeen Kestrel |
| <i>Malurus melanocephalus</i> | Red-backed Fairy-wren |
| <i>Manorina melanocephala</i> | Noisy Miner |
| <i>Megalurus timoriensis</i> | Tawny Grassbird |
| <i>Ocyphaps lophotes</i> | Crested Pigeon |
| <i>Pardalotus striatus</i> | Striated Pardalote |
| <i>Philemon corniculatus</i> | Noisy Friarbird |
| <i>Platycercus adscitus</i> | Pale-headed Rosella |
| <i>Rhipidura albiscapa</i> | Grey Fantail |
| <i>Rhipidura leucophrys</i> | Willie Wagtail |
| <i>Smicromnis brevirostris</i> | Weebill |
| <i>Strepera graculina</i> | Pied Currawong |

Area 52 contains the following habitat resources:

- Dense groundcover vegetation (ie grassy tussocks)
- Limited woody debris (ie fallen/felled timber, including hollow-bearing logs)
- Limited leaf litter
- Rocky crevices in the north-western portion of the site
- A dam is located approximately 150 m east of the site

Area 52 has been cleared historically, with no canopy cover, hollows or fissured tree bark suitable for shelter, perching and foraging resources. Dense ground cover vegetation (ie grassy tussocks), limited leaf litter, limited woody debris (ie fallen/felled timber) and rocky crevices (only present in the north-western portion of the site) may provide shelter and foraging resources for small mammals and reptiles. Overall, the fauna habitat value for Area 52 is considered low.

A dam was observed east of the site that may provide suitable habitat for amphibians and birds. Vegetation analogous to 'no concern at present' RE 11.10.1/11.10.13a is located adjacent to the site. Although this vegetation and dam are located outside of Area 52, highly mobile species such as birds may fly over the site in transit.

No conservation significant fauna species were recorded within the proposed development area.

4 Area 53

General

The proposed development area within Area 53 is situated in the northern portion of Lot 5 WT217. The site is mapped as 'no concern at present' RE 11.10.4/11.10.7 under the DNRM certified mapping. These RE classifications are described in Table 4.1. A 'Category C' ESA is located approximately 50 m west and 180 m east of Area 53. This ESA is due to the presence of mapped 'remnant' 'of concern' vegetation (ie RE 11.3.25/11.3.2). However, a RE Amendment Report was submitted to and approved by DNRM, as this mapping is incorrect and has been changed to 'no concern at present' RE 11.10.4/11.10.7. In addition, a 'Category B' ESA is located 300 m north-west of Area 53, due to the presence of a National Park.

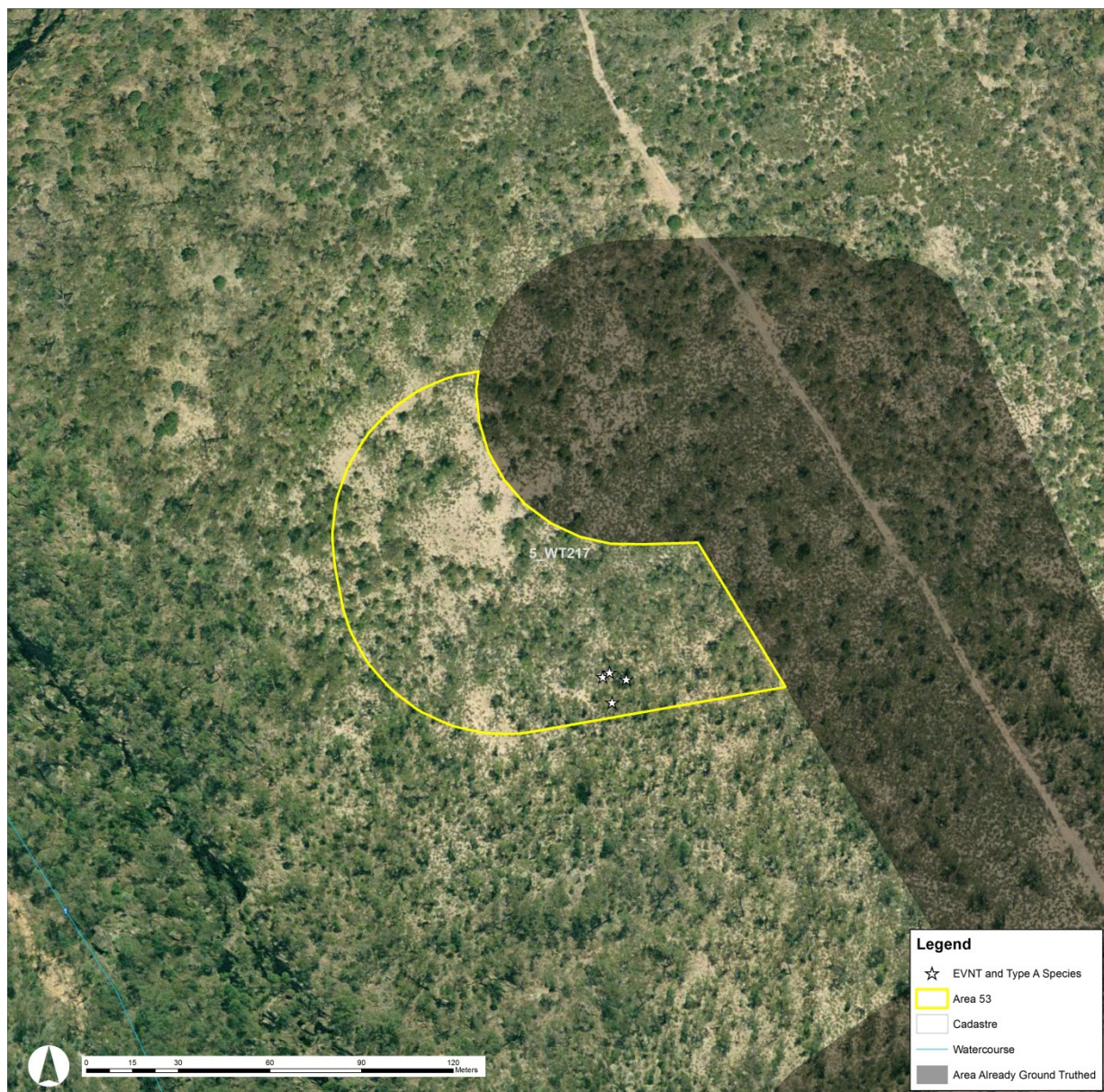


Table 4.1 Regional ecosystem descriptions

| RE | Description | Biodiversity Status |
|---------|--|-----------------------|
| 11.10.4 | <i>Eucalyptus decorticans</i> , <i>Lysicarpus angustifolius</i> +/- <i>Eucalyptus</i> spp., <i>Corymbia</i> spp., <i>Acacia</i> spp. Woodland on coarse-grained sedimentary rocks. Crests and scarps | No concern at present |
| 11.10.7 | <i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks | No concern at present |

A mapped 'stream order 1' 'watercourse' is located approximately 120 m west of Area 53 which flows south to north.

The landform of Area 53 is flat to undulating, with pale grey sandy soils present.

Floristics

The canopy layer in Area 53 was approximately 12 to 15 m in height with approximately 5% vegetation cover and contains *Lysicarpus angustifolius* (Budgeroo) and *Eucalyptus tenuipes* (Narrow-leaved White Mahogany). The sub-canopy layer was approximately 6 to 9 m in height with a Foliage Projection Cover (FPC) of approximately 38% (calculated using the line-intercept method over 100 m transect adapted from Eyre *et al.* 2011. Refer Attachment 2). The sub-canopy layer was dominated by *Eucalyptus tenuipes*, with *Corymbia trachyphloia* (Small-fruited Bloodwood), *Eucalyptus crebra* (Narrow-leaved Ironbark) and several dead trees (stags).

The dense shrub layer within Area 53 has approximately 70% vegetation cover and was approximately 1 to 4 m in height. The shrub layer is dominated by *Acacia catenulata* (Bendee). Species occurring at lesser densities in the shrub layer include *Acacia decora*, *Lomandra longifolia* (Lomandra), *Lomandra multiflora* (Lomandra), *Maytenus cunninghamii* (Yellow Berry Bush), *Hakea lorea* (Bootlace Oak), juvenile *Eucalyptus tenuipes*, juvenile *Eucalyptus crebra* and *Acacia bancroftiorum* (Bancroft's Wattle). The 'Type A restricted plant' species, *Xanthorrhoea johnsonii* (Grass Tree), was also observed in the shrub layer.

The ground layer was dominated by leaf litter and woody debris (approximately 46%), with approximately 28% native grasses and forbs and 15% bare ground (refer Attachment 2). The ground layer was dominated by *Austrostipa verticillata*, with *Scaevola spinescens* (Spiny Scaevola), *Sporobolus caroli* (Fairy Grass), *Eragrostis molybdea* (Granite Lovegrass) and *Goodenia* sp. A full list of species recorded at the sites is outlined in Attachment 1.

Twelve 'Type A restricted plants' (ie *Xanthorrhoea johnsonii*) were recorded within Area 53. These locations are listed in Table 4.2 and depicted in Figure 1.1.

Table 4.2 Locations of Type A restricted plants within Area 53

| Scientific Name | Common Name | Easting (GDA 94, Zone 55) | Northing (GDA 94, Zone 55) |
|-----------------------------------|-------------|---------------------------|----------------------------|
| <i>Xanthorrhoea johnsonii</i> | Grass Tree | 695580 | 7167902 |
| <i>Xanthorrhoea johnsonii</i> | Grass Tree | 695564 | 7167910 |
| 6 x <i>Xanthorrhoea johnsonii</i> | Grass Tree | 695490 | 7167872 |
| 4 x <i>Xanthorrhoea johnsonii</i> | Grass Tree | 695559 | 7168027 |

No species of conservation significance were recorded within Area 53.

Habitat values

Ten fauna species were observed during site investigations, comprising nine birds and one reptile. Traces of an additional two mammals were recorded (refer Table 4.3).

Table 4.3 Fauna species observed in Area 53

| Scientific Name | Common Name | Comment |
|---------------------------------|---------------------------|---------------------|
| <i>Carlia foliorum</i> | Tree-base Litter-skink | |
| <i>Corcorax melanorhamphos</i> | White-winged Chough | |
| <i>Corvus orru</i> | Torresian Crow | |
| <i>Cracticus nigrogularis</i> | Pied Butcherbird | |
| <i>Cracticus torquatus</i> | Grey Butcherbird | |
| <i>Egretta novaehollandiae</i> | White-faced Heron | |
| <i>Macropus giganteus</i> | Eastern Grey Kangaroo | Observed scats only |
| <i>Macropus sp.</i> | | Observed scats only |
| <i>Melithreptus albogularis</i> | White-throated Honeyeater | |
| <i>Oriolus sagittatus</i> | Olive-backed Oriole | |
| <i>Pardalotus striatus</i> | Striated Pardalote | |
| <i>Strepera graculina</i> | Pied Currawong | |

In Area 53, the following habitat features are present:

- Canopy cover suitable for shelter, foraging and perching
- Fissured tree bark
- Dense groundcover vegetation (ie grassy tussocks)
- Woody debris (ie fallen/felled timber, including hollow-bearing logs)
- Leaf litter
- Limited rocky crevices

Area 53 contains suitable habitat for macropods, insectivorous birds, reptiles and small mammals. Due to the lack of hollows and floristic diversity (including flowering species at the time of the survey), Area 53 is unlikely to be suitable habitat for nectar-feeding birds, arboreal mammals and hollow-dependent species. Overall, the fauna habitat value for the site is considered moderate (refer Photo 4.1).

No conservation significant fauna species were recorded within Area 53.



Photo 4.1 Facing north in Area 53

5 Stockpile/Laydown 3

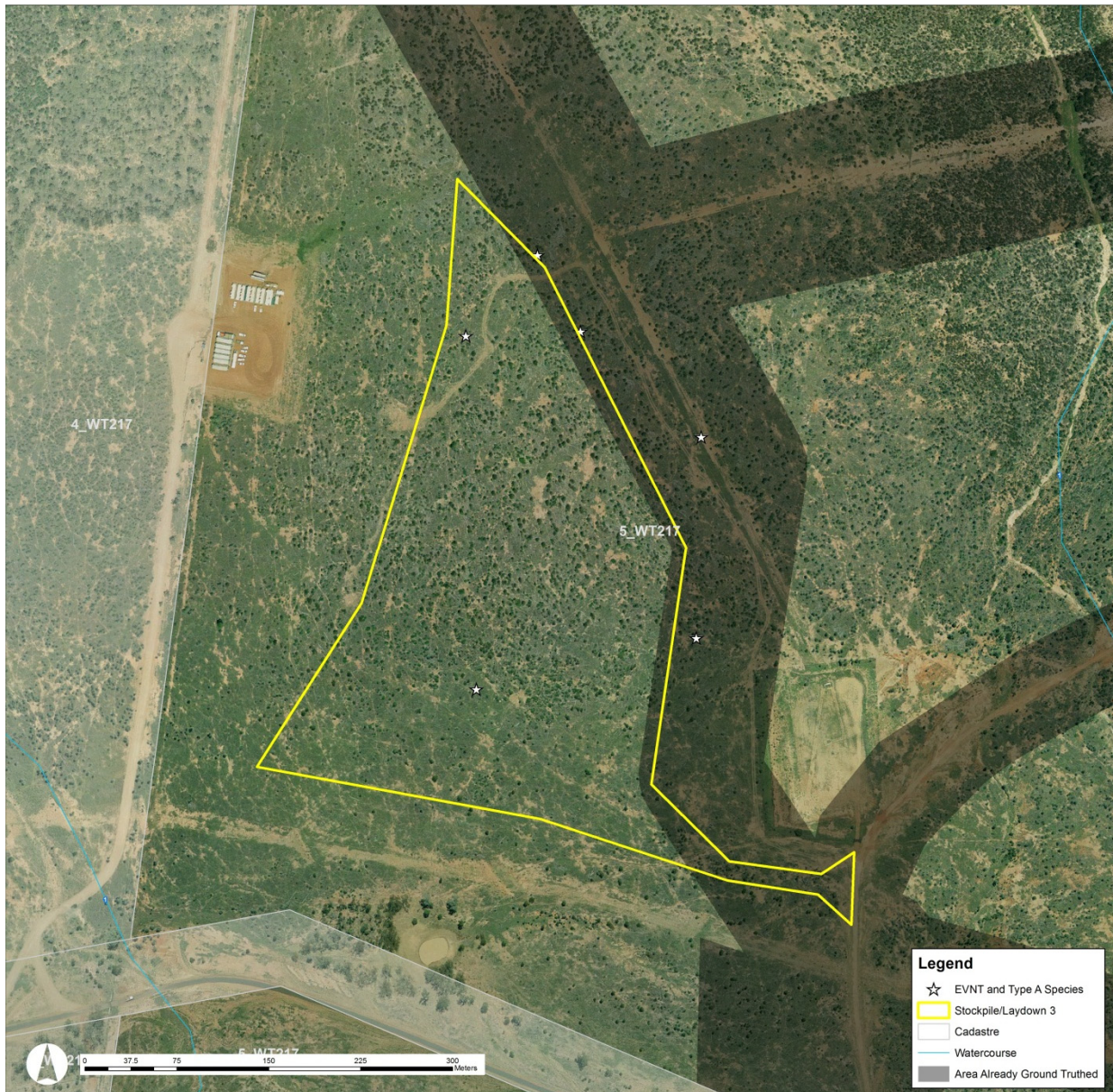
General

The proposed Stockpile/Laydown 3 area is located in the western portion of Lot 5 WT217 (refer Figure 1.1). The area has been previously cleared as a result of agricultural practices (including stock grazing) and adjacent infrastructure (eg roads, access tracks and existing wells). The area has also been subject to minor fire disturbance.

No REs are mapped within the development area. A 'Category C' ESA is located approximately 500 m north and north-west of the site. This ESA is due to the presence of mapped 'remnant' 'of concern' vegetation (ie RE 11.10.4/11.10.7).

Two mapped 'watercourses' are located in proximity to the proposed Stockpile/Laydown 3 area. Approximately 300 m east there is a 'stream order 1' 'watercourse' that flows south to north and approximately 100 m west there is another 'stream order 1' 'watercourse' that also flows south to north.

The landform of the Stockpile/Laydown 3 is an undulating plain, with brown clay soils.



Floristics

The canopy layer within the proposed Stockpile/Laydown 3 area is approximately 4 to 8 m in height, with approximately 35% vegetation cover and is dominated by *Eucalyptus populneus*. Other species occurring in lesser densities include *Eucalyptus melanophloia* and *Acacia leiocalyx*.

The shrub layer is approximately 1 to 3 m in height, with approximately 15% vegetation cover and is dominated by *Eremophila mitchellii*. Other species occurring commonly in the shrub layer include *Dodonaea viscosa*, *Maireana microphylla*, juvenile *Eucalyptus populneus*, *Alectryon oleifolius* *Pittosporum angustifolium* (Native Apricot) and *Petalostigma pubescens*. A 'Type A restricted plant' species listed under the provisions of the NC Act, *Brachychiton populneus* (Kurrajong), was also observed in the shrub layer.

The ground cover is dense with approximately 90% cover of the total area assessed. The ground layer is dominated by the exotic species *Bothriochloa pertusa*. Other ground cover species observed commonly throughout the area include *Cirsium vulgare*, *Sida subspicata*, *Sporobolus creber*, *Verbena tenuisecta*, *Eragrostis molybdea*, *Cymbopogon refractus*, *Heteropogon contortus*, *Panicum effusum* and *Pennisetum ciliare*. A full list of species recorded at the sites is outlined in Attachment 1.

Five 'Type A restricted plants' (ie *Brachychiton populneus*) were observed within the Stockpile/Laydown 3 area. These locations are listed in Table 5.1 and depicted in Figure 1.1.

Table 5.1 Locations of Type A restricted plants within the Stockpile/Laydown 3 area

| Scientific Name | Common Name | Easting (GDA 94, Zone 55) | Northing (GDA 94, Zone 55) |
|-----------------------------------|-------------|---------------------------|----------------------------|
| 2 x <i>Brachychiton populneus</i> | Kurrajong | 691315 | 7165830 |
| <i>Brachychiton populneus</i> | Kurrajong | 691394 | 7166117 |
| <i>Brachychiton populneus</i> | Kurrajong | 691366 | 7166189 |
| <i>Brachychiton populneus</i> | Kurrajong | 691308 | 7166127 |

No species of conservation significance were recorded within the Stockpile/Laydown 3 area.

Habitat values

Seven birds were observed during site investigations. Traces of two mammals were also recorded (refer Table 5.2).

| Scientific Name | Common Name | Comment |
|---------------------------------|---------------------------|------------------------|
| <i>Coracina novaehollandiae</i> | Black-faced Cuckoo-shrike | |
| <i>Corvus coronoides</i> | Australian Raven | |
| <i>Corvus orru</i> | Torresian Crow | |
| <i>Cracticus nigrogularis</i> | Pied Butcherbird | |
| <i>Elanus axillaris</i> | Black-shouldered Kite | |
| <i>Grallina cyanoleuca</i> | Magpie-lark | |
| <i>Macropus</i> sp. | | Observed scats only |
| <i>Smicrornis brevirostris</i> | Weebill | |
| <i>Trachyglossus aculeatus</i> | Echidna | Observed diggings only |

The proposed Stockpile/Laydown 3 area has the following habitat features present:

- Some canopy cover suitable for shelter, foraging and perching
- Dense groundcover vegetation (ie grassy tussocks)
- Woody debris (ie felled timber)
- Leaf litter
- A dam is located south of the site

The Stockpile/Laydown 3 area contains suitable habitat for ground-dwelling mammals and reptiles due to the large amount of woody debris, leaf litter and dense ground cover. The site also contains shelter, perching and foraging resources for birds and macropods. Overall, the fauna habitat value for the site is considered moderate.

No conservation significant fauna species were recorded within the Stockpile/Laydown 3 area.

Conclusion

The ecological assessment found that the majority of Areas 50a, 51, 52 and the Stockpile/Laydown 3 area on Lot 5 WT217 have been disturbed due to agricultural practices, including stock grazing. Ground-truthing has confirmed that Area 53 proposed for disturbance contains 'no concern at present' remnant vegetation. However, there are no areas analogous to ESAs. There were no conservation significant species recorded during site investigations. Numerous individuals of the 'Type A restricted plant' species listed under the provisions of the NC Act (ie *Xanthorrhoea johnsonii* and *Brachychiton populneus*) were observed within Areas 53 and the Stockpile/Laydown 3 area.

References

Department of Environment and Resource Management (DERM) (2012) Vegetation Management Act Regional Ecosystem and Remnant Map (Version 6.1).

Eyre, T.J., Kelly, A.L., Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. (2011). *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland*. Assessment Manual. Version 2.1. Department of Environment and Resource Management (DERM), Biodiversity and Ecosystem Sciences, Brisbane.

Attachment 1: Botanical species recorded at Areas 50a, 51, 52, 53 and Stockpile/Laydown 3

| Family Name | Scientific Name | Common Name | Notes |
|-----------------|----------------------------------|------------------------------|------------------------|
| Adiantaceae | <i>Cheilanthes sieberi</i> | Mulga Fern | |
| Apocynaceae | <i>Alstonia constricta</i> | Bitter Bark | |
| Apocynaceae | <i>Carissa ovata</i> | Currant Bush | |
| Apocynaceae | <i>Gomphocarpus physocarpus</i> | Balloon Cotton Bush | Non-native |
| Apocynaceae | <i>Marsdenia</i> sp. | | |
| Apocynaceae | <i>Parsonia lanceolata</i> | Monkey Rope | |
| Asteraceae | <i>Bidens pilosa</i> | Cobblers Pegs | Non-native |
| Asteraceae | <i>Brachyscome whitei</i> | Daisy | |
| Asteraceae | <i>Calotis cuneifolia</i> | Purple Burr Daisy | |
| Asteraceae | <i>Calotis lappulacea</i> | Yellow Burr Daisy | |
| Asteraceae | <i>Cassinia laevis</i> | Cough Bush | |
| Asteraceae | <i>Chrysocephalum apiculatum</i> | Yellow Buttons | |
| Asteraceae | <i>Cirsium vulgare</i> | Spear Thistle, Black Thistle | Non-native |
| Asteraceae | <i>Conyza bonariensis</i> | Fleabane | Non-native |
| Asteraceae | <i>Podolepis jaceoides</i> | Showy Copper Wire Daisy | |
| Asteraceae | <i>Pterocaulon sphacelatum</i> | Apple Bush | |
| Asteraceae | <i>Senecio lautus</i> | Fire Weed | |
| Asteraceae | <i>Tagetes minuta</i> | Stinking Rodger | Non-native |
| Asteraceae | <i>Xerochrysum bracteatum</i> | Everlasting Daisy | |
| Asteraceae | <i>Zinnia multiflora</i> | Zinnia | |
| Cactaceae | <i>Opuntia stricta</i> | Prickly Pear | LPA Act 'Class 2 pest' |
| Cactaceae | <i>Opuntia tomentosa</i> | Velvety Tree Pear | LPA Act 'Class 2 pest' |
| Caesalpiniaceae | <i>Senna artemisioides</i> | Senna | Non-native |
| Celastraceae | <i>Maytenus cunninghamii</i> | Yellow Berry Bush | |
| Campanulaceae | <i>Wahlenbergia gracilis</i> | Sprawling Bluebell | |
| Capparaceae | <i>Capparis lasiantha</i> | Nipan, Wait-a-while | |
| Capparaceae | <i>Capparis spinosa</i> | Caper Bush | |
| Casuarinaceae | <i>Allocasuarina luehmannii</i> | Bull Oak | |
| Celastraceae | <i>Elaeodendron australis</i> | Peach Leaf | |
| Chenopodiaceae | <i>Maireana microphylla</i> | Small-leaf Bluebush | |
| Cupressaceae | <i>Callitris glaucophylla</i> | White Cypress Pine | |
| Cyperaceae | <i>Cyperus polystachyos</i> | Bunchy Sedge | |
| Cyperaceae | <i>Cyperus rigidellus</i> | Curly Flat Sedge | |
| Cyperaceae | <i>Cyperus</i> sp. | | |
| Cyperaceae | <i>Fimbristylis dichotoma</i> | Fimbristylis | |

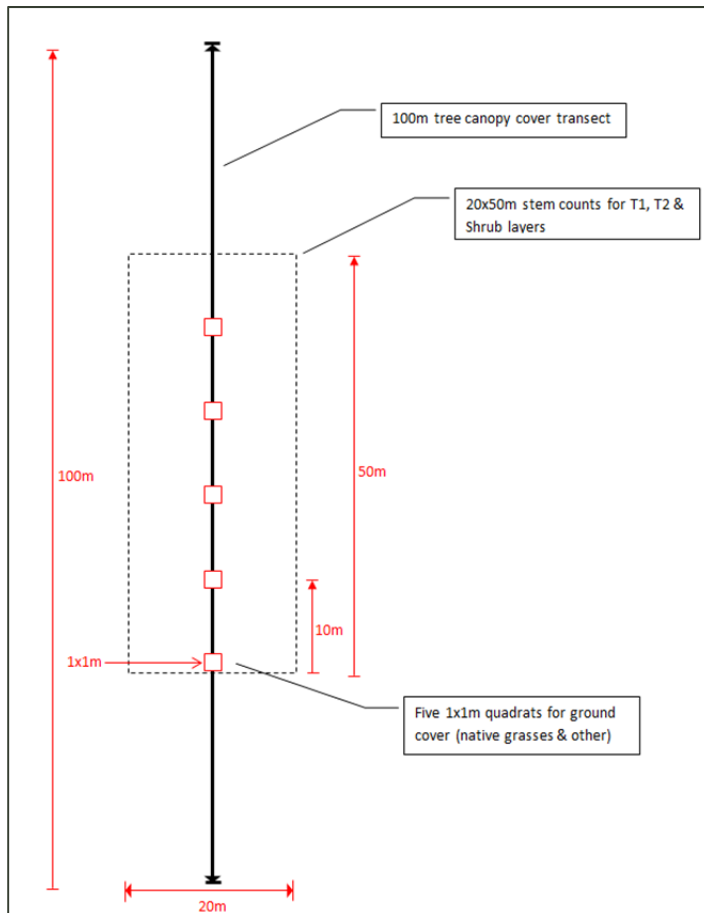
| Family Name | Scientific Name | Common Name | Notes |
|-------------------|--------------------------------|-------------------------|-------|
| Cyperaceae | <i>Gahnia aspera</i> | Saw Sedge | |
| Fabaceae | <i>Desmodium varians</i> | Tree Foil | |
| Fabaceae | <i>Glycine tomentella</i> | Hairy Glycine | |
| Fabaceae | <i>Hovea lorata</i> | Hovea | |
| Fabaceae | <i>Swainsona</i> sp. | | |
| Goodeniaceae | <i>Goodenia glabra</i> | Smooth Goodenia | |
| Goodeniaceae | <i>Goodenia rotundifolia</i> | Goodenia | |
| Goodeniaceae | <i>Goodenia</i> sp. | | |
| Goodeniaceae | <i>Scaevola spinescens</i> | Spiny Scaevola | |
| Hemerocallidaceae | <i>Dianella revoluta</i> | Blue Flax-lily | |
| Hemerocallidaceae | <i>Dianella caerulea</i> | Blue Flax-lily | |
| Lamiaceae | <i>Spartothamnella juncea</i> | Native Broom | |
| Laxmanniaceae | <i>Lomandra leucocephala</i> | Lomandra | |
| Laxmanniaceae | <i>Lomandra hystrix</i> | Creek Mat Rush | |
| Laxmanniaceae | <i>Lomandra longifolia</i> | Lomandra | |
| Laxmanniaceae | <i>Lomandra multiflora</i> | Lomandra | |
| Luzuriagaceae | <i>Eustrephus latifolia</i> | Wombat Berry | |
| Malvaceae | <i>Abutilon oxycarpum</i> | Flannel Flower | |
| Malvaceae | <i>Sida corrugata</i> | Corrugated Sida | |
| Malvaceae | <i>Sida rohlenae</i> | Shrub Sida | |
| Malvaceae | <i>Sida subspicata</i> | Queensland Hemp | |
| Mimosaceae | <i>Acacia bancroftiorum</i> | Bancroft's Wattle | |
| Mimosaceae | <i>Acacia catenulata</i> | Bendee | |
| Mimosaceae | <i>Acacia complanata</i> | Velvet Wattle | |
| Mimosaceae | <i>Acacia decora</i> | Pretty Wattle | |
| Mimosaceae | <i>Acacia leiocalyx</i> | Black Wattle | |
| Mimosaceae | <i>Acacia salicina</i> | Sally Wattle | |
| Mimosaceae | <i>Acacia</i> sp. | | |
| Mimosaceae | <i>Neptunia gracilis</i> | Native Sensitive Weed | |
| Myoporaceae | <i>Eremophila debilis</i> | Winter Apple | |
| Myoporaceae | <i>Eremophila deserti</i> | Turkey Bush | |
| Myoporaceae | <i>Eremophila mitchellii</i> | False Sandalwood | |
| Myoporaceae | <i>Myoporum acuminatum</i> | Boobialla | |
| Myrtaceae | <i>Corymbia clarksoniana</i> | Clarkson's Bloodwood | |
| Myrtaceae | <i>Corymbia trachyphloia</i> | Small-fruited Bloodwood | |
| Myrtaceae | <i>Eucalyptus crebra</i> | Narrow-leaved Ironbark | |
| Myrtaceae | <i>Eucalyptus melanophloia</i> | Silver Leaved Ironbark | |

| Family Name | Scientific Name | Common Name | Notes |
|-----------------|--|------------------------------|------------|
| Myrtaceae | <i>Eucalyptus melanophloia</i> X <i>E. populnea</i> | | |
| Myrtaceae | <i>Eucalyptus populnea</i> | Poplar Box | |
| Myrtaceae | <i>Eucalyptus tenuipes</i> | Narrow-leaved White Mahogany | |
| Myrtaceae | <i>Lysicarpus angustifolius</i> | Budgeroo | |
| Oleaceae | <i>Jasminum simplicifolium</i> | Native Jasmine | |
| Oleaceae | <i>Notelaea</i> sp. | | |
| Picrodendraceae | <i>Petalostigma pubescens</i> | Quinine | |
| Pittosporaceae | <i>Bursaria spinosa</i> | Prickly Pine | |
| Pittosporaceae | <i>Pittosporum angustifolium</i> | Native Apricot | |
| Poaceae | <i>Aristida caput-medusae</i> | Curly Head Wire Grass | |
| Poaceae | <i>Aristida jerichoensis</i> | Jericho Wire Grass | |
| Poaceae | <i>Aristida latifolia</i> | Hairy Aristida | |
| Poaceae | <i>Austrostipa verticillata</i> | Slender Bamboo Grass | |
| Poaceae | <i>Bothriochloa bladhii</i> | Forest Blue Grass | |
| Poaceae | <i>Bothriochloa decipiens</i> var. <i>decipiens</i> | Pitted Blue Grass | |
| Poaceae | <i>Bothriochloa pertusa</i> | Indian Couch | Non-native |
| Poaceae | <i>Chloris pectinata</i> | Comb Chloris | |
| Poaceae | <i>Chloris truncata</i> | Windmill Grass | |
| Poaceae | <i>Cymbopogon refractus</i> | Barbwire Grass | |
| Poaceae | <i>Cynodon dactylon</i> | Green Couch | Non-native |
| Poaceae | <i>Dichanthium sericeum</i> | Queensland Blue Grass | |
| Poaceae | <i>Enneapogon avenaceus</i> | Bottle Washer | |
| Poaceae | <i>Eragrostis brownii</i> | Brown's Lovegrass | |
| Poaceae | <i>Eragrostis molybdea</i> | Granite Lovegrass | |
| Poaceae | <i>Eragrostis purpurea</i> | | |
| Poaceae | <i>Heteropogon contortus</i> | Black Spear Grass | |
| Poaceae | <i>Melinis repens</i> | Red Natal | Non-native |
| Poaceae | <i>Panicum decompositum</i> | Hairy Panic | |
| Poaceae | <i>Panicum effusum</i> | Inquisitive Grass | |
| Poaceae | <i>Pennisetum ciliare</i> | Buffel Grass | Non-native |
| Poaceae | <i>Perotis rara</i> | Comet Grass | |
| Poaceae | <i>Sporobolus actinocladius</i> | Ray Grass | |
| Poaceae | <i>Sporobolus caroli</i> | Fairy Grass | |
| Poaceae | <i>Sporobolus creber</i> | Western Rat's Tail Grass | |
| Poaceae | <i>Themeda avenacea</i> | Wild Oats Grass | |
| Poaceae | <i>Themeda triandra</i> | Kangaroo Grass | |

| Family Name | Scientific Name | Common Name | Notes |
|------------------|--------------------------------|-----------------------|----------------------------------|
| Proteaceae | <i>Grevillea striata</i> | Beefwood | |
| Proteaceae | <i>Hakea lorea</i> | Bootlace Oak | |
| Rhamnaceae | <i>Alphitonia excelsa</i> | Red Ash | |
| Rubiaceae | <i>Psyrax oleifolia</i> | Hat stand, Wild Lemon | |
| Rutaceae | <i>Citrus glauca</i> | Lime Bush | |
| Rutaceae | <i>Geijera parviflora</i> | Wilga | |
| Sapindaceae | <i>Alectryon diversifolius</i> | Scrub Boonaree | |
| Sapindaceae | <i>Alectryon oleifolius</i> | Boonaree | |
| Sapindaceae | <i>Atalaya hemiglauc</i> | Whitewood | |
| Sapindaceae | <i>Dodonaea triangularis</i> | Fan Hopbush | |
| Sapindaceae | <i>Dodonaea viscosa</i> | Sticky Hopbush | |
| Solanaceae | <i>Solanum esuriale</i> | Brown Potato Bush | |
| Sterculiaceae | <i>Brachychiton populneus</i> | Kurrajong | NC Act 'Type A restricted plant' |
| Sterculiaceae | <i>Keraudrenia collina</i> | Keraudrenia | |
| Tiliaceae | <i>Grewia latifolia</i> | Dysentery Plant | |
| Verbenaceae | <i>Verbena rigida</i> | Veined Verbena | Non-native |
| Verbenaceae | <i>Verbena tenuisecta</i> | Mayne's Curse | Non-native |
| Xanthorrhoeaceae | <i>Xanthorrhoea johnsonii</i> | Grass Tree | NC Act 'Type A restricted plant' |

Attachment 2 – Detailed vegetation survey data collected for Area 53

This attachment provides the ground cover, canopy cover and stem count data collected during the field investigation for Area 53. The diagram below shows the transect arrangement in the field, and the areas within which the data was collected.



Ground cover data

The following values indicate the percentage of each ground cover category for five 1x1 m quadrats. The average ground cover for each category is also provided in the 'Averages' column.

| Groundcover | Q 1 (%) | Q 2 (%) | Q 3 (%) | Q 4 (%) | Q 5 (%) | Averages (%) |
|--------------------------|---------|---------|---------|---------|---------|--------------|
| Native grasses/forbs | 55 | 25 | 0 | 12 | 50 | 28.4 |
| Non-native grasses/forbs | 0 | 0 | 0 | 0 | 0 | 0 |
| Shrubs | 15 | 5 | 0 | 5 | 10 | 7 |
| Cryptograms | 0 | 0 | 0 | 0 | 0 | 0 |
| Rock | 0 | 0 | 0 | 1 | 1 | 0.4 |
| Leaf litter | 30 | 60 | 100 | 5 | 39 | 46.8 |
| Bare ground | 0 | 0 | 0 | 77 | 0 | 15.4 |

Stem count data

The following table is the stem count data collected during the field investigation for the Canopy (T1), Sub-canopy (T2) and Shrub layer (S1). The heights for each of the stratum are also defined below.

| Transect | Stem counts per stratum per 10 x 5 m plots | | |
|---------------|--|------------|------------|
| | T1 (12-15 m) | T2 (6-9 m) | S1 (1-4 m) |
| 0-10 m | 0 | 23 | 34 |
| 10-20 m | 0 | 6 | 66 |
| 20-30 m | 0 | 2 | 25 |
| 30-40 m | 0 | 0 | 22 |
| 40-50 m | 0 | 0 | 35 |
| Totals | 0 | 31 | 182 |

Stems per hectare calculations

- **T1** (12-15 m) – 0 stems per hectare
- **T2** (6-9 m) – 124 stems per hectare
- **S1** (1-4 m) – 728 stems per hectare

Foliage projective cover data

The total Foliage Projective Cover (FPC) for the T1 and T2 canopies along a 100 m transect, expressed as a percentage is:

- **T1** (12-15 m) – **0% FPC**
- **T2** (6-9 m) – **38.4% FPC**

The canopy transect data collected during the field investigation is provided in the following table.

| Stratum | Distance Start | End | Total (m) |
|----------------|----------------|------|-----------|
| 0-100 m | | | |
| T2 | 2.5 | 12 | 9.5 |
| T2 | 14.5 | 15.8 | 1.3 |
| T2 | 21 | 27 | 6 |
| T2 | 51 | 55.5 | 4.5 |
| T2 | 61 | 68 | 7 |
| T2 | 73.4 | 78.2 | 4.8 |
| T2 | 93.5 | 97 | 3.5 |
| T2 | 98.2 | 100 | 1.8 |