Simmons Road Nature Reserve (R36096)
Environmental Assessment
2018

Prepared for: Department of Biodiversity, Conservation and Attraction (DBCA)
Perth Hills District
District Nature Conservation Program

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EXECUTIVE SUMMARY

This report has been prepared by Del Botanics on behalf of Department of Biodiversity, Conservation and Attractions (DBCA) to review remnant flora, fauna and vegetation on Simmons Road Nature Reserve. A site survey was undertaken in November 2017 and March 2018. The site is approximately 108 kilometres south east of the Perth central area, in the Shire of Brookton.

Simmons Road Nature Reserve (R36096) consists of approximately 486.4 hectares of Wandoo (*Eucalyptus wandoo*) Powderbark (*Eucalyptus accedens*) and Jarrah (*Eucalyptus marginata*) Woodland. The purpose of this reserve is to conserve the Flora and Vegetation.

The soils found in Simmons Rd Nature Reserve can be referred to as the *Zone of Rejuvenated Drainage*. This zone is defined by the Meckering Line to the east and the Darling Range Zone to the west. It encompasses the major portion of the Shire of Beverley and about a third of the Shire of Brookton. It represents the 'Inner Wheatbelt' and the central portion of the Avon Valley.

A large portion of the vegetation within Simmons Rd Nature Reserve is in “Very Good” condition and provides a great example of the variety of vegetation communities. During the site visits, vegetation communities were broadly mapped and described by recording the dominant tree species and upper level flora species. The vegetation described on site can be categorised into three broad vegetation communities.

Simmons Rd Nature Reserve is a conservation reserve for the protection of the vegetation communities. The reserve is currently in very good condition and provides a valuable habitat for fauna with diverse habitats and an array of flora species.

STATEMENT OF LIMITATIONS

This environmental report has been prepared in accordance with the scope of services set out in the original quotation. In preparing the report, Del Botanics has relied on data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report. Del Botanics has not verified the accuracy or completeness of the data to the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report are based in whole or in part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Del Botanics will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, unavailable, misrepresented or otherwise not fully disclosed.

In accordance with the scope of services, Del Botanics has have relied on publically available data and information supplied by DBCA and have conducted environmental field monitoring in the preparation of the report. The nature and extent of monitoring conducted is described in the report. Within the limitations imposed by the scope of services, the monitoring and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care. No other warranty, express or implied, is made.

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1. INTRODUCTION

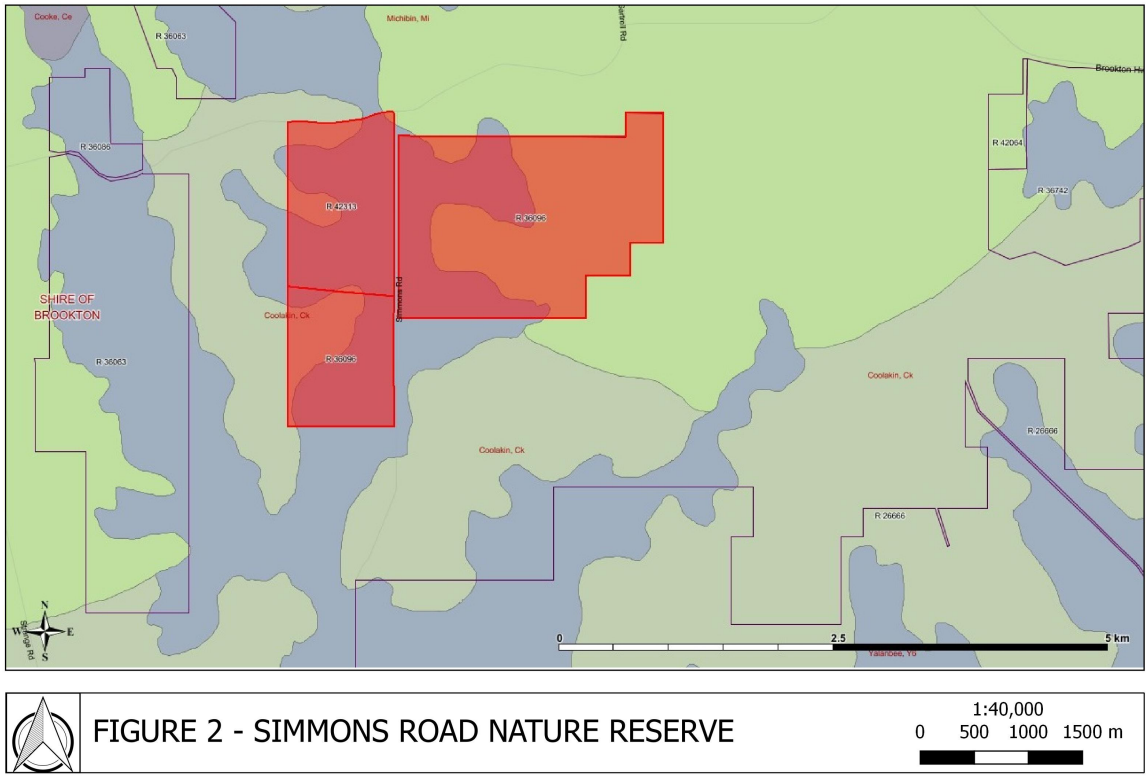
1.1 SIMMONS RD NATURE RESERVE

This report has been prepared by Del Botanics on behalf of Department of Biodiversity, Conservation and Attractions (DBCA) to review remnant flora, fauna and vegetation on Simmons Road Nature Reserve. A site survey was undertaken in November 2017 and March 2018. The site is approximately 108 kilometres south east of the Perth central area, in the Shire of Brookton. The location of the site is shown on **Figure 1** below.

Figure 1: Simmons Rd Nature Reserve Location

The Shire of Brookton covers an area of 161,283 hectares and is located in the Avon River Catchment. The Avon River flows through the eastern part of the shire. Simmons Rd Nature Reserve is approximately 41km west of the Brookton town site and is shown in red on **Figure 2** below. The purpose of this reserve is to conserve the current vegetation communities.

Figure 2: Simmons Rd Nature Reserve



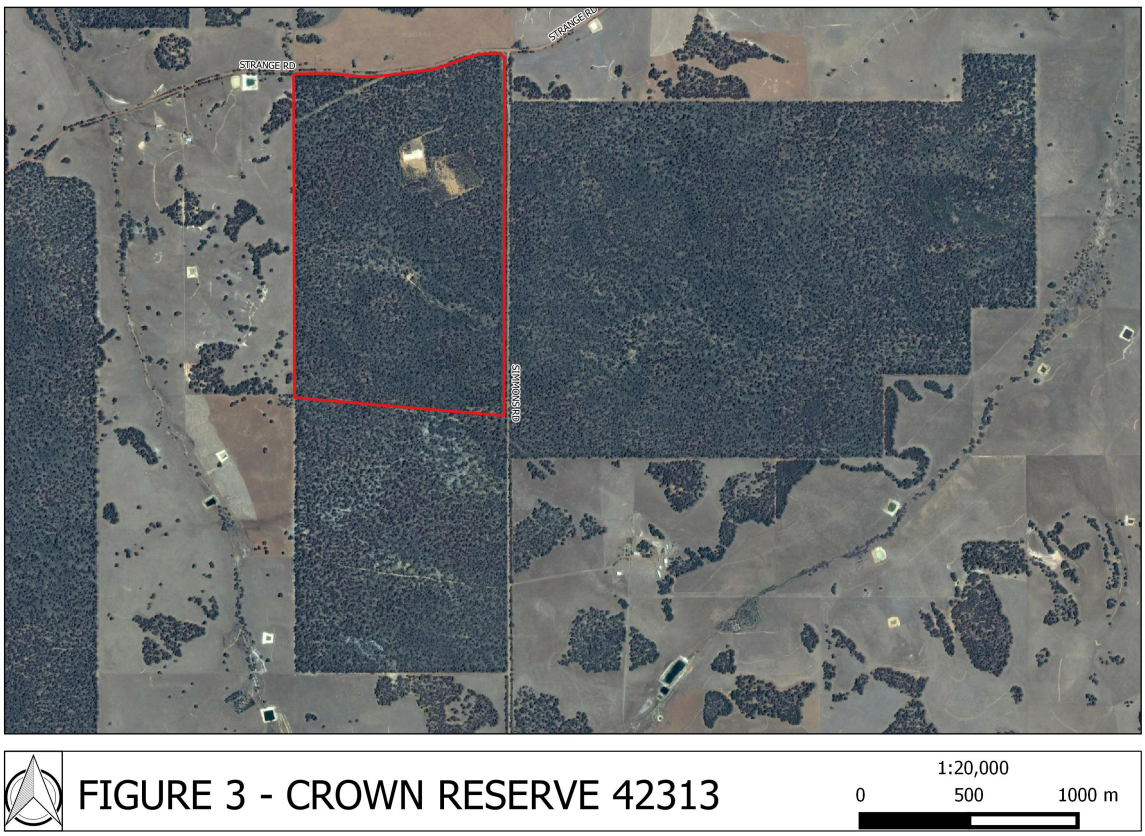
Simmons Road Nature Reserve (R36096) is approximately 486.4 hectares. It is a representative of the breakaway country on the eastern flanks of the Darling Range. It contains a mixture of Wandoo (*Eucalyptus wandoo*) Powderbark (*Eucalyptus accedens*) and Jarrah (*Eucalyptus marginata*) Woodland. Jarrah dominated woodland occupies the southern half of the western block (Safstrom, 1997). The Native Vegetation Handbook for the Shire of Brookton, (Safstrom, 1997) describes Simmons Rd NR as having 3 dominant plant associations. They are described as:

1. Powderbark wandoo low woodland with varying proportions of Jarrah (10-20%) over dwarf Sheaoak heath or Parrot Bush (*Banksia sessilis*) scrub (60% of the reserve area).
2. Jarrah low woodland over Pingle (*Dryandra carduaceae*) low scrub. Occasional Marri (*Corymbia calophylla*). This association occurs at the top of the landscape. A 50/50 mix of Jarrah and Marri occurs on the edges of this association (20% of the reserve area).
3. Powderbark wandoo low woodland, with Wandoo confined to the gullies. Little understorey, occasional patches of *Gastrolobium spp*. Remainder grasses (20% of the reserve area).

1.2 LOCAL GOVERNMENT AREA

The area shown below on **Figure 3,** Crown Reserve 42313 is currently vested with the Shire of Brookton and the commissioner of Main Roads and managed by the Main Roads Department. This areas current use is gravel extraction. Although this area is not part of the Simmons Rd NR, information has been collected from this site to show the adjacent vegetation types and condition.

Figure 3: Crown Reserve 42313



1.3 HISTORY

The first European farmers settled in the Avon Valley in 1831 and established themselves as pastoralists, grazing sheep on native herbage and cropping small areas of the better soil types. In 1880 the railway came to the Avon Valley and large advances to agriculture were made in the early 1900's. Native vegetation in the Shire of Brookton has been significantly cleared for agricultural purposes.

Photo 1: Historic clearing within the Northern Section (Local Government Area) of Simmons Rd Nature Reserve.

Native vegetation in the Shire of Brookton has been significantly cleared for agricultural purposes. The district was first settled in the mid 1800's and the best country for agriculture, the woodlands on heavy soils in the valleys were cleared by hand. Much of the sandplain areas were cleared post 1950's with bulldozers. Remnant vegetation areas were often cleared in the early days as they were seen to habour rabbits. The remaining areas of native vegteation are mostly the areas unsuitable for agriculture, such as granite outcrops, breakaway country and saline areas. Woodland and sandplain country are very poorly represented in reserves and much of the woodlands that do remain on private land have been degraded by grazing, weed invasion and inapropriate fire regimes.

Photo 2: Simmons Rd NR Powderbark Wandoo Woodland

2. EXISTING ENVIRONMENT

2.1 SOILS AND LANDFORMS

Brookton is underlain by Archaean rocks of the Yilgarn Block which has been a relatively stable part of the earth's crust for 2400 million years. The Great Plateau of Western Australia, referred to locally as the Darling Plateau, is the surface expression of the Yilgarn Block. The ancient 'basement' rocks of the Darling Plateau are composed of predominantly granite and metamorphics with localised intrusions of narrow quartz or dolerite dykes.

The surface of the Darling Plateau was once extensively mantled by Tertiary (Cainozoic) laterite and associated weathering products. Although the plateau is now substantially dissected by major drainage systems, remnants of the lateritised surface occur in upper parts of the landscape and along drainage divides.

2.1.1 Localised soils

The soils found in Simmons Rd Nature Reserve can be referred to as the *Zone of Rejuvenated Drainage*. This zone is defined by the Meckering Line to the east and the Darling Range Zone to the west. It encompasses the major portion of the Shire of Beverley and about a third of the Shire of Brookton. It represents the 'Inner Wheatbelt' and the central portion of the Avon Valley. The Zone of Rejuvenated Drainage is characterised by a greater degree of dissection of the landscape than in the Zone of Ancient Drainage to the east. Thus steeper, narrower valleys are formed which contain rivers and creeks that flow every winter. Large areas of yellow duplex soils have formed here from the dissection of the lateritic profile. In areas where the lateritic profile has been completely removed there are extensive areas of rocky, red and greyish soils developed from fresh rock. The valley floors contain alluvial clays, loams and sands (Beecham, 2001).

2.2 VEGETATION

A large portion of the vegetation within Simmons Rd Nature Reserve is in very good condition and provides a great example of the variety of vegetation communities which dominated the area prior to European settlement. The vegetation varies from Jarrah woodland with scattered Marri, transitioning to Jarrah, Powderbark Wandoo Woodland and into Powderbark Wandoo/Wandoo woodland over a sparse open understorey. The southwest of Western Australia has been divided into districts, known as Natural Resource Zones, which are determined by their vegetation type, drainage/catchment system and rainfall. The Shire of Brookton contains parts of two Natural Resource Zones, the Swan/Avon catchment, which includes the Northern Jarrah Forrest and the Wheatbelt Vegetation District, which includes the Darling and Avon Districts.

Photo 3: Jarrah (*Eucalyptus marginata*) Woodland

Photo 4: Jarrah (*Eucalyptus marginata*) Powderbark Wandoo (*Eucalyptus accedens*) Woodland

Photo 5: Wandoo (*Eucalyptus wandoo*) and Powderbark Wandoo (*Eucalyptus accedens*) Woodland.

2.3 CLIMATE

The Shire's climate consists of a warm Mediterranean climate with hot dry summers and mild wet winters. Brookton receives, on average 430mm rainfall per annum. Average maximum temperatures range from 30°C in January and 17.1°C in July, while average minimum temperatures range from 16.1°C in February to 4.6°C in August.

3. FLORA, FAUNA AND VEGETATION

The survey area lies in the Drummond Botanical Subdistrict within the Southwest Botanical Province as described by Beard (1990). Flora composition has been described by Beard (1990) as predominantly consisting of *Banksia* Low Woodlands on leached sands with *Melaleuca* swamps where ill drained and Woodlands of *Eucalyptus* spp. on less leached soils. This area has been described by Beard (1990) as the Avon Botanical District.

The updated mapping system IBRA (*Interim Biogeographic Regionalisation for Australia*) was developed in 1993-94 and is endorsed by all levels of government as a key tool for identifying land for conservation under *Australia's Strategy for the National Reserve System 2009-2030*. The nationally agreed regionalisation was published in Thackway and Cresswell (1995), *An Interim Biogeographic Regionalisation for Australia: a framework for establishing the national system of reserves*.

The latest version, IBRA7, classifies Australia's landscapes into 89 large geographically distinct bioregions based on common climate, geology, landform, native vegetation and species information. The IBRA description of vegetation for this area is best categorised as the Avon Wheatbelt Region.

3.1 FLORA

The site is dominated by Jarrah woodland with variations including Jarrah with Powderbark Wandoo and a distinctive Powderbark Wandoo/ Wandoo woodland. There are a diverse number of understorey species, which are available in **Appendix A** and low densities and number of weed species.

Photo 6: *Stylidium repens*

Photo 7: *Petrophile serruriae*

3.1.1 Threatened flora

A search of the Department of Biodiversity, Conservation and Attractions (DBCA) NatureMap database identified one Threatened (T) and two Priority 3 (P3) species within a 5 km radius, likely to occur within the area. These species are listed in **Table 1** below.

Table 1: NatureMap listed flora species

Species Name	Common Name	Conservation Code
Hibbertia glomerata subsp. *wandoo*		P3
Pultenaea pauciflora	Narrogin Pea	T
Synaphea pandurata		P3

A search of the EPBC Protected Matters database identified six flora species of significance within a 5 km radius, likely to occur within the area. Two flora species have been listed as Endangered and three species are listed as Vulnerable. These species are listed in **Table 2** below.

Table 2: EPBC listed flora species

Species Name	Common Name	Conservation Code
Diuris micrantha	Dwarf Bee-orchid	Vulnerable
Eleocharis keigheryi	Keighery's Eleocharis	Vulnerable
Pultenaea pauciflora	Narrogin Pea	Vulnerable
Thelymitra dedmaniarum	Cinnamon Sun Orchid	Endangered
Verticordia fimbrilepis subsp. fimbrilepis	Shy Featherflower	Endangered

3.1.2 Weeds

Invasive plants are widespread in fragmented landscapes that have been highly modified, and where nutrient enrichment of soils and frequent disturbance encourages the establishment of weeds over native vegetation. Established weeds compete with native plants, affecting their recruitment and survival, reducing the habitat quality for native fauna. Grassy weeds can also increase the flammability of the vegetation, increasing fire frequency and intensity. Once established, weeds become a long-term and potentially costly management issue.

There are a low number of weed species and densities on average across the site. Weeds are dominant along the edges of the reserve, adjacent to firebreaks and private properties. Weed control may be applied to the areas along the fence lines, however due to the adjacent farming properties weeds may continue to present an issue along the fence lines. It is important to reduce weeds from entering into the bushland.

Photo 8: Weeds along the fence line of the South East Section of the reserve

3.2 FAUNA

Due to the location of the reserve and the reduced areas of other natural bushland in the area, this reserve is an important refuge for native animals and is a valuable stepping stone of native vegetation in this landscape. Species recorded onsite are available in **Appendix B.**

3.2.1 Threatened Fauna

A search of the Department of Biodiversity, Conservation and Attractions (DBCA) NatureMap database identified two priority species within a 5 km radius, likely to occur within the area. One Priority 4 (P4) and one Threatened (T) species are listed in **Table 3** below.

Table 3: NatureMap listed fauna species

Species Name	Common Name	Conservation Code
Idiosoma nigrum	Shield-backed Trapdoor Spider	T
Macropus irma	Western Brush Wallaby	P4

The Protected Matters Search Tool was used to determine fauna species protected by the EPBC Act which are considered likely to occur within a 5km radius of the reserve. The search result noted eight fauna species of significance likely to occur in the area. One fauna species is listed as Critically Endangered, two species have been listed as Endangered and five species are listed as Vulnerable. These species are listed in **Table 4** below.

Table 4: EPBC listed fauna species

Species Name	Common Name	Conservation Code
Bettongia penicillata	Brush-tailed Bettong, Woylie	Endangered
Calidris ferruginea	Curlew Sandpiper	Critically Endangered
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo, Karrak	Vulnerable
Calyptorhynchus baudinii	Baudin's Black-Cockatoo, Long-billed Black-Cockatoo	Vulnerable
Calyptorhynchus latirostris	Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo	Endangered
Dasyurus geoffroii	Chuditch, Western Quoll	Vulnerable
Leipoa ocellata	Malleefowl	Vulnerable
Phascogale calura	Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor	Vulnerable

3.2.2 Feral Animals

Several species of invasive animals have established in the Wheatbelt region and impacted upon native vegetation and fauna. Feral cats (*Felis catus*) and the European fox (*Vulpes vulpes*) are key predators that prey upon ground-dwelling native fauna. The European rabbit (*Oryctolagus cuniculus*) causes direct loss of plant species, and indirect loss of native plant and animal species through changes to soil structure and nutrient dynamics by their digging, burrowing and grazing activities. There is evidence within the reserve of foxes and rabbits. The site may have a high number of feral animals due to the large size of the reserve and the close vicinity to farming properties.

3.2.3 Local Habitat Condition

Simmons Rd Nature Reserve has potential habitat for ground dwelling fauna. The site contains fallen logs and leaf litter. The site also has hollows both on the ground and in trees, which would provide suitable habitat for a range of fauna including ground dwelling species. Further investigations will determine the habitat suitability for specific fauna, including numbats.

Photo 9: Woodland with logs and hollows

Photo 10: Powderbark Wandoo/Wandoo Woodland with logs and hollows

3.3 VEGETATION

The original vegetation of the region has been mapped and described by Beard (1979, 1980). The major parts of the Shires of Beverley and Brookton fall into the Avon Botanical District, although a small area along the western boundary of both Shires is part of the Darling District (Dale Subdistrict). The Shire of Brookton includes Jarrah Forrest on its western margin with a mix of cleared farming land and forested country with wandoo (*Eucalyptus wandoo*) and areas of Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) towards the east of their range.

Jarrah and Marri Forest: The Jarrah forest occurs in the higher rainfall western areas on the lateritic plateau (Darling District). Jarrah (*Eucalyptus marginata*) is the dominant tree, and is normally accompanied by Marri (*Corymbia calophylla*). On some sites it will also be associated with Blackbutt (*E. patens*), Wandoo (*E. wandoo*) and Powderbark Wandoo (*E. accedens*). There is also often a lower layer of small trees, including *Banksia grandis*, *Allocasuarina fraseriana* and *Persoonia longifolia*.

Jarrah - Marri - Wandoo - Powderbark - Brown Mallet Woodlands: On the eastern edge of the lateritic plateau (Darling grading into Avon District), woodland replaces the Jarrah forest, due to the declining rainfall. The principal components are Jarrah, Wandoo and Powderbark Wandoo. Jam (*Acacia accuminata*) and Rock sheoak (*Allocasuarina huegeliana*) are common associated species in most areas, but land clearing has eliminated most of the smaller species once present. On the dissected slopes below the plateau, a mixture of Marri - Wandoo woodland occurs. Further east, the plant communities are comprised of scattered shrubs and rock sheoak. There are woodlands of Powderbark Wandoo and brown mallet (*E. astringens*) on lateritic plateau remnants, woodlands of Wandoo and Powderbark on upperslopes, Marri and Wandoo on middle slopes, and York gum on lower slopes close to drainage lines.

3.3.1 Vegetation Complexes

Vegetation complexes are based on the pattern of vegetation at a regional scale as they reflect the underlying key determining factors of landforms, soils and climate. The Perth and Peel Regions are spread over two IBRA regions, the Swan Coastal Plain and Jarrah Forest. The Jarrah Forest IBRA region can be divided into two sub-regions, the Northern Jarrah Forest, and the Southern Jarrah Forest. The Perth and Peel Region extends only to the Northern Jarrah Forest IBRA sub-region.

The following inputs were used to create a data layer of remnant vegetation extent by vegetation complexes for the Swan Coastal Plain and the Jarrah Forest IBRA, including the Perth and Peel Region Scheme areas:

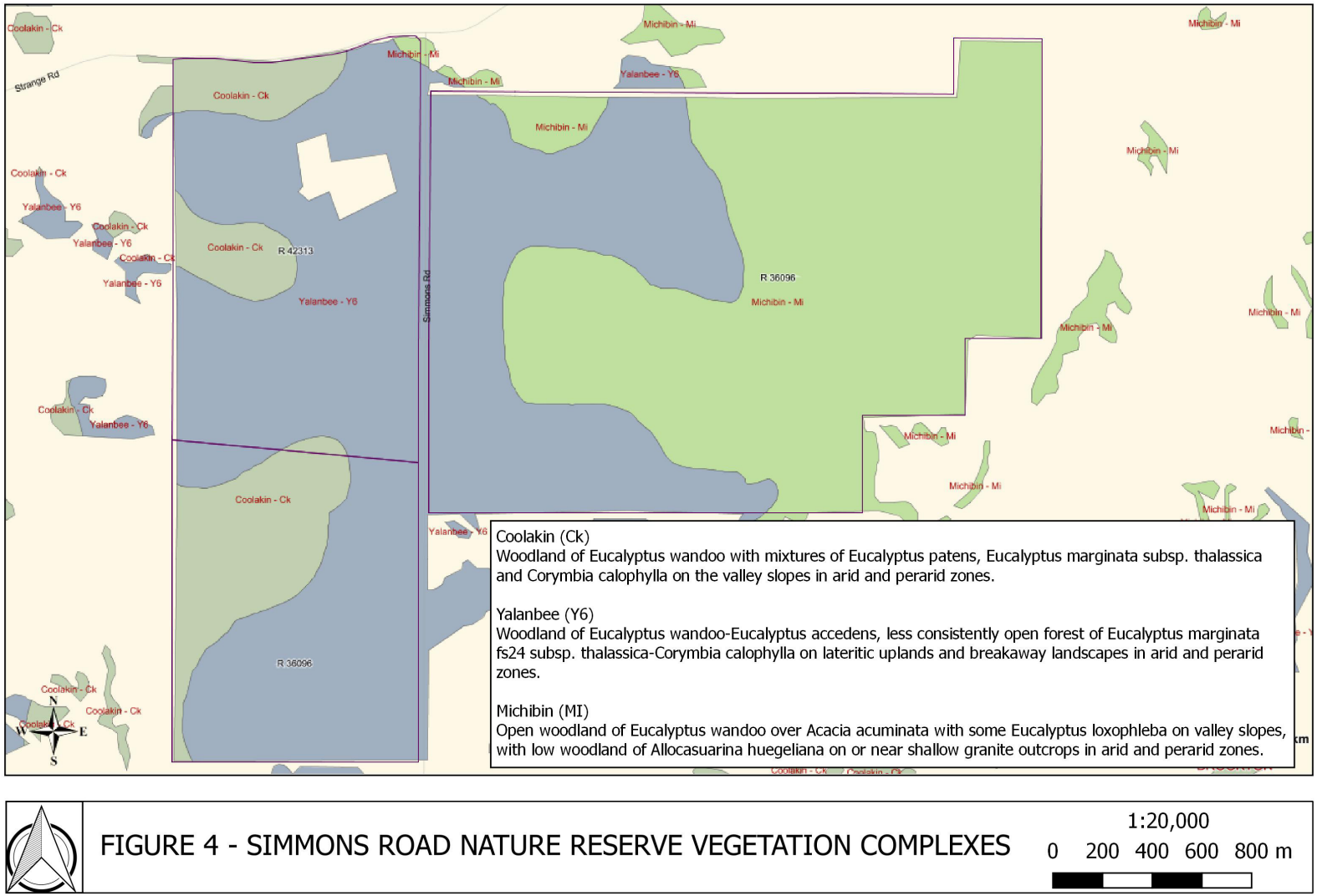
- DAFWA (2014) - Current extent of native vegetation (Remnant vegetation)
- Heddle et al (1980) - Vegetation of the Darling System, Department of Environment and Conservation (south of Moore River)
- Mattiske & Havel (2000) - Vegetation complex mapping for the South West Forest Region and for the Swan Coastal Plain in the Busselton area.

There are 27 and 18 vegetation complexes represented within the Swan Coastal Plain and Jarrah Forest portions of the Perth and Peel Scheme Regions, respectively. The Vegetation complexes recorded at Simmons Rd Nature Reserve are described below.

Native vegetation complexes occurring at Simmons Rd NR are shown below on **Figure 4**:

- Coolakin - Ck 66.9 ha
- Yalanbee - Y6 339 ha
- Michibin – Mi 233.36

Figure 4: Simmons Rd Nature Reserve, Vegetation Complexes



3.3.2 Vegetation complexes found within Simmons Rd Nature Reserve

Coolakin

Woodland of *Eucalyptus wandoo* with mixtures of *Eucalyptus patens, Eucalyptus marginata* subsp. *thalassica* and *Corymbia calophylla* on the valley slopes in arid and perarid zones.

Yalanbee (Y6)

Woodland of *Eucalyptus wandoo-Eucalyptus accedens*, less consistently open forest of *Eucalyptus marginata* fs24 subsp. *thalassica-Corymbia calophylla* on lateritic uplands and breakaway landscapes in arid and perarid zones.

Michibin

Open woodland of *Eucalyptus wandoo* over *Acacia acuminata* with some *Eucalyptus loxophleba* on valley slopes, with low woodland of *Allocasuarina huegeliana* on or near shallow granite outcrops in arid and perarid zones.

Photo 11: PowderbarkWoodland found within the reserve

Photo 12: Granite outcrop located in the south east corner of the reserve

3.3.3 Local Vegetation Communities

During the site visits, vegetation communities were broadly mapped and described by recording the dominant tree species and upper level flora species. The vegetation described on site can be categorised into three broad vegetation communities. These communities are described below in **Table 5** and shown on **Figure 5.**

Table 5: Vegetation Communities

Mapping Code	Community Descriptions
Vegetation Community 1 – Jarrah Woodland	
1	Open forest of *Eucalyptus marginata and Corymbia calophylla*, over open shrubland of *Banksia sessilis, Banksia squarrosa, Adenanthos cygnorum*, over low open shrubland of *Allocasuarina humilis, Bossiaea spp, Hibbertia spp and Daviesia decurrens.*
Mapping Code	**Community Descriptions**
Vegetation Community 2 – Jarrah Woodland with Powderbark Wandoo	
2	Open forest of *Eucalyptus marginata with Eucalyptus accedens.with scattered Corymbia calophylla and Eucalyptus wando*and open shrubland of *Allocasuarina humilis, Petrophile Hibbertia spp and Daviesia decurrens*
Mapping Code	**Community Descriptions**
Vegetation Community 3 – Powderbark Wandoo Woodland	
3	Open forest of *Eucalyptus accedens and Eucalyptus wandoo*, over open shrubland of *Alllocasuraina humilis, Banksia proteoides, Macrozamia reideli, Neurachne alopecuroides* and *Austrostipa flavescens*

3.3.4 Threatened Ecological Communities

The EPBC Act provides for the strong protection of TEC's, which are listed under section 181 of the Act and are described as 'Critically Endangered', 'Endangered' or 'Vulnerable' under section 182. Schedules of protected TECs maintained pursuant to the EPBC Act are based on the same FCT's as adopted by DPaW, however not all TEC's listed by the DPaW are scheduled under the EPBC Act.

An EPBC Act Protected Matters Report indicated there is one known Threatened Ecological Community (TEC) likely to occur in the area, this is listed in **Table 6**.

Table 6: EPBC listed Threatened Ecological Communities

Threatened Ecological Community	Conservation Code	Comments
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community likely to occur in the area

After visiting the site, Del Botanics is of the opinion that a large portion of Simmons Road reserve contains eucalypt woodlands that would fit this critically endangered community type; however further surveying would be required to confirm the presence and extent of the community.

3.3.5 Vegetation Condition

Many bushland remnants have been historically subject to ongoing degradation and are especially susceptible to disturbances arising as a result of indirect impacts from surrounding developments and human activity. Degradation is caused by a wide range of factors, including isolation and edge effects, weed invasion, plant diseases, changes in fire frequency and behaviour, landscape fragmentation, increased predation on native fauna by feral animals, decrease in species richness and general modification of ecological function. These issues can affect the biodiversity rating and ecological viability of areas of remnant vegetation and should be assessed in line with conservation values.

The Vegetation Condition was rated according to the Vegetation Condition Scale commonly used in the Perth Metropolitan Region (Government of WA 2000). The definitions are described in **Table 7** below.

Table 7: Vegetation Condition Scale (Taken from Bush Forever (Government of WA 2000))

Vegetation Condition	Definition
Pristine (1)	Pristine or nearly so, no obvious signs of disturbance.
Excellent (2)	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very Good (3)	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing
Good (4)	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
Degraded (5)	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Completely Degraded (6)	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

In general, the vegetation condition ranged from "Degraded" to "Very Good" in the study area. Vegetation condition mapping is provided in **Figure 6.**

The Jarrah located within the site appears to be under stress with a large number of trees showing signs of crown decline.

Photo 13: Jarrah trees under stress

Photo 14: Marri in Very Good condition

Photo 15: Jarrah Woodland, in Very Good vegetation condition

4. TRACK CONDITIONS, SIGNAGE AND ILLEGAL ACTIVITY

4.1 TRACK CONDITION AND FIREBREAKS

Simmons Rd NR has access to the west and east off Simmons rd. However there are only firebreaks around the perimeter of this section of the reserve. There is a track that runs through the middle of the western side of the reserve, separating the reserve and the Local Government Area.

The Fire break along the south west boundary is easy accessible. The adjoining firebreak along the western boundary heading north is in good condition. The firebreak along the southern boundary on the eastern section of the reserve needs to be cleared as it is overgrown in places and not accessible. The eastern boundary is accessible but does require some maintenance works in places. The eastern and northern boundaries on the eastern side are in very good condition and are easily accessible and areas requiring maintenance are marked on the maps provided as **Figures 5 and 6**.

Photo 16: Over grown firebreak on the southern boundary of the reserve, in the eastern section of the reserve.

Photo 17: Firebreaks on the northern perimeter of the reserve, in the eastern section of the reserve.

Photo 18: Firebreaks on the eastern perimeter of the reserve, in the eastern section of the reserve.

4.2 FENCING

The overall condition of the fencing is good, with small sections in need of repair, as shown on **Figures 5 & 6**. Ongoing maintenance is important as the reserve is bounded by working farms with various livestock. Small sections of fencing in need of repair appear to be caused by kangaroo movements; this issue could be discussed with the adjoining properties with the potential of installing kangaroo gates to reduce the need for ongoing maintenance. There is no fencing along Simmons road, which separates the two sections of the reserve to the west and east, which allows faunal movement across the two sections of the reserve. There is also no fencing along Strange Rd, which allows access into the reserve via the Local Government Gravel Pit area.

Photo 19: Fence in good condition along the western boundary

Photo 20: Access to the reserve from an adjacent farming property on the western boundary

4.3 SIGNAGE

During the site visit, four signs were observed; they were all along Simmons Road and are shown on **Figure 5**.

Photo 21: Signage along Simmons Rd

4.4 ILLEGAL ACTIVITY

There are no current signs of motorbikes or cars accessing the reserve. There appears to be limited activity in this area. There are historic signs of wood cutting and rubbish dumping, including garden waste, however these areas are limited. Evidence of this type of activity was mostly observed in the Local Government area and the south west section adjoining the Local Government area and along Simmons Rd.

Photo 22: Rubbish dumping on the western side of the reserve, off Simmons Rd

Photo 23: Evidence of wood cutting in the Southern Section of the reserve

5. PHYTOPHTHORA DIEBACK

Dieback disease caused by the pathogen *Phytophthora cinnamomi* is a major threat to the biodiversity of south-western Australia. The spread of this water mould is facilitated by the movement of soil, water or plant material infested with spores, particularly under warm, moist conditions. Dieback affects a wide range of plant species and about 40% of native plants in WA are considered potentially susceptible to the disease, the plant groups most affected are the banksia family (Proteaceae), heath family (Epacridaceae) and pea family (Fabaceae), all of which have species present in the WA Wheatbelt Woodlands. Jarrah trees are one of the few eucalypt species known to be susceptible to the disease.

It generally occurs in areas that receive 400 mm or more annual rainfall, and especially the high rainfall zone that gets >800 mm annual rainfall. The vegetation most affected includes the Jarrah forests of the Darling Ranges, the taller forests of the far south-west and the kwongkan and *Banksia* shrublands of the Swan Coastal Plain and Esperance Sandplains. Given the relationship of dieback to moisture and rainfall, its threat to the WA Wheatbelt Woodlands is largely potential, as this area receives over 400mm annually.

There are signs that dieback may occur within the reserve, there are a number of Jarrah deaths within the reserve. Further testing in this area will be required to confirm or otherwise the presence of dieback.

Photo 24: A number of Jarrah deaths in the reserve

6. FIRE

Prior to European settlement, fires occurred through lightning strikes and Indigenous burning of the landscape. Indigenous burning practices had been adopted for up to 60 000 years and likely comprised a mosaic of frequent, small-scale fires, often during summer months in the more mesic woodlands of the western Wheatbelt. Since European settlement, fires still occur through lightning strikes. However, they now also originate from prescribed burning operations (including escaped from planned fires), arson or accidental ignition due to a range of sources. The nature and impacts of fire is influenced by other threats in the landscape. Fragmentation into small remnants and the surrounding modified land use can affect the intensity and impact of fires across a patch. The type of understorey may promote or suppress fire spread. Frequency of fire is one important consideration in addition to fire intensity and season. Too frequent fires may eliminate sensitive species. For example: obligate seeder species that require fire to stimulate seed germination may die out if recurring fires kill plants before they have a chance to mature and develop new seeds; and fauna may decline due to the loss of food and shelter resources after frequent fires.

The main concern for natural remnants in the Wheatbelt is a lack of fire or much longer intervals between fire events. The lack of fire limits recruitment of plant species, especially those that require heat, smoke or other features of a fire to stimulate germination and establishment of seedlings. It also impacts on fauna by limiting development of habitat diversity, especially opportunities for new tree hollows and logs, or not allowing the regeneration of dense thickets of trees and shrubs, that give shelter to many kinds of fauna. It is important to develop appropriate fire management with the use of mosaic burning to maintain the diversity of habitats for flora and fauna.

There are no immediate signs of recent fire activity. Evidence on the vegetation suggests the last fire may have been more than 10 years ago. The bush retained in the reserve on the western side of Simmons Rd has a firebreak around the whole area, if you are to include the Local Government owned section it also includes a track through the middle of the reserve, some areas however do need to be maintained, which are shown on **Figures 5 & 6**. The reserve on the eastern side of Simmons Rd has a firebreak around the perimeter of the reserve. The firebreaks do need to be maintained and currently will require works to allow access around the entire reserve.

7. POTENTIAL THREATS

Nationally-listed key threatening processes

The following are EPBC-listed key threatening processes, current as at February 2015, that are relevant to the WA Wheatbelt Woodland ecological community:

- Competition and land degradation by rabbits
- Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*)
- Land clearance
- Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases
- Novel biota and their impact on biodiversity
- Predation by European red fox
- Predation by feral cats
- Predation, habitat degradation, competition and disease transmission by feral pigs

The threats listed above should be considered when implementing future plans for the conservation and protection of the reserve.

Photo 25: Powderbark Woodland in the reserve

8. CONCULSION AND RECOMMENDATIONS

Simmons Rd Nature Reserve is a conservation reserve for the protection of vegetation, flora and fauna. The reserve is currently in a very good condition and provides valuable habitat for fauna with a diverse number of flora species.

Based on the results of this assessment, Del Botanics proposes the following reserve management recommendations:

- Implement a dieback and hygiene management plan, including periodic dieback survey and treatment;
- Implement a weed management plan;
- Undertake fire break maintenance, as detailed on **Figures 5 & 6**;
- Undertake a Level two flora survey;
- Undertake a Threatened Ecological Community Assessment for *Eucalypt Woodlands of the Western Australian Wheatbelt*;
- Undertake a targeted Declared Rare Flora Search for the species listed below. These species have been selected as a result of a background search of the site; however the search should not be limited to these species but should also include any DRF found within the reserve.
- Undertake a Targeted Fauna Search for the species listed below. These species have been selected as a result of a background search of the site; however the search should not be limited to these species but should also include any Threatened fauna found within the reserve.

Targeted Flora Search List species

Species Name	Common Name	Conservation Code
Hibbertia glomerata subsp. *wandoo*		P3
Pultenaea pauciflora	Narrogin Pea	T
Synaphea pandurata		P3
Diuris micrantha	Dwarf Bee-orchid	Vulnerable
Eleocharis keigheryi	Keighery's Eleocharis	Vulnerable
Pultenaea pauciflora	Narrogin Pea	Vulnerable
Thelymitra dedmaniarum	Cinnamon Sun Orchid	Endangered
Verticordia fimbrilepis subsp. fimbrilepis	Shy Featherflower	Endangered

Targeted Fauna Search List species

Species Name	Common Name	Conservation Code
Idiosoma nigrum	Shield-backed Trapdoor Spider	T
Macropus irma	Western Brush Wallaby	P4
Bettongia penicillata	Brush-tailed Bettong, Woylie	Endangered
Calidris ferruginea	Curlew Sandpiper	Critically Endangered
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo, Karrak	Vulnerable
Calyptorhynchus baudinii	Baudin's Black-Cockatoo, Long-billed Black-Cockatoo	Vulnerable
Calyptorhynchus latirostris	Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo	Endangered
Dasyurus geoffroii	Chuditch, Western Quoll	Vulnerable
Leipoa ocellata	Malleefowl	Vulnerable
Phascogale calura	Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor	Vulnerable

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FIGURES

FIGURE 5: VEGETATION COMMUNITIES

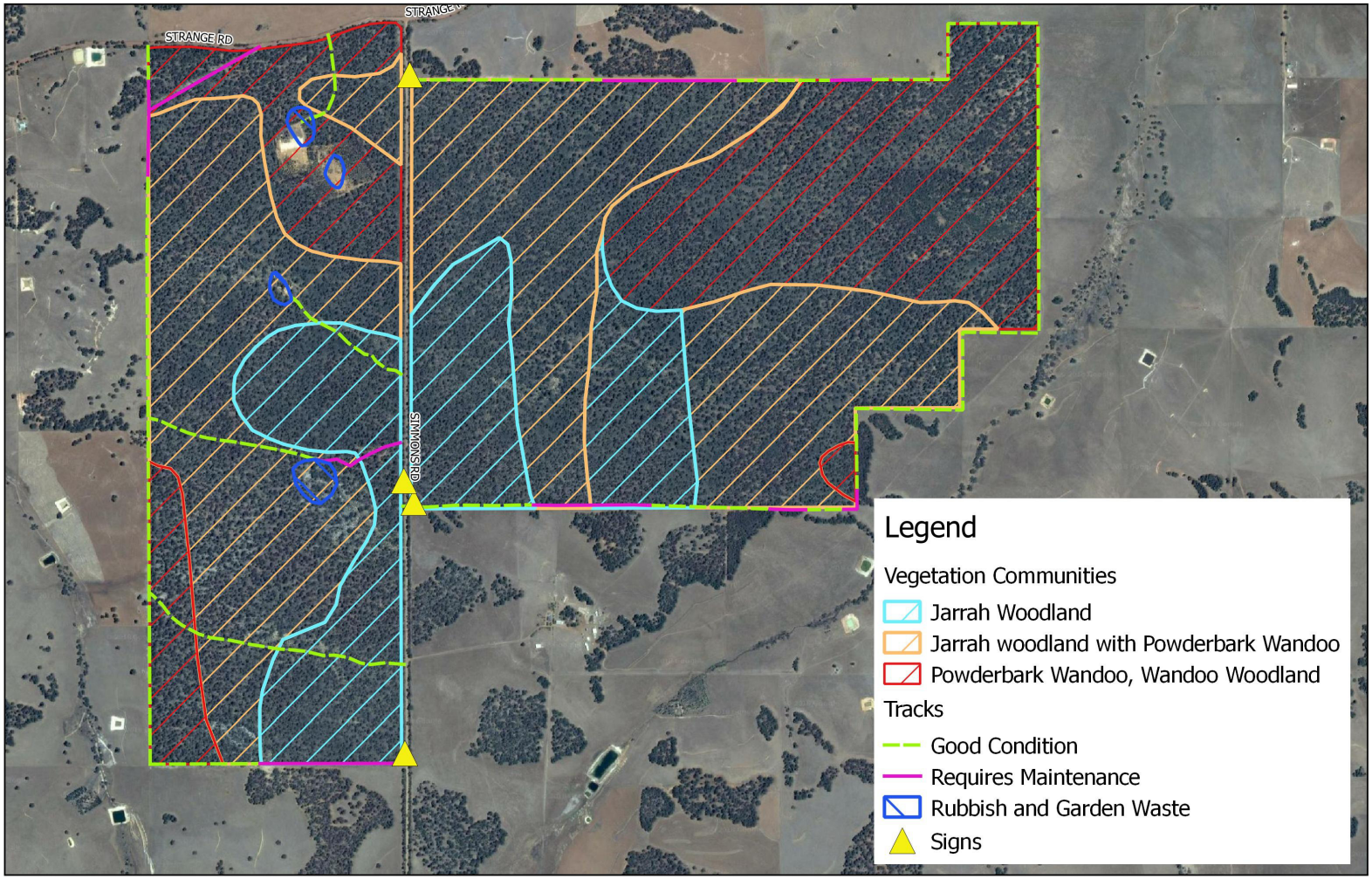

FIGURE 5 - VEGETATION COMMUNITIES

1:20,000

0 500 1000 m

FIGURE 6: VEGETATION CONDITION

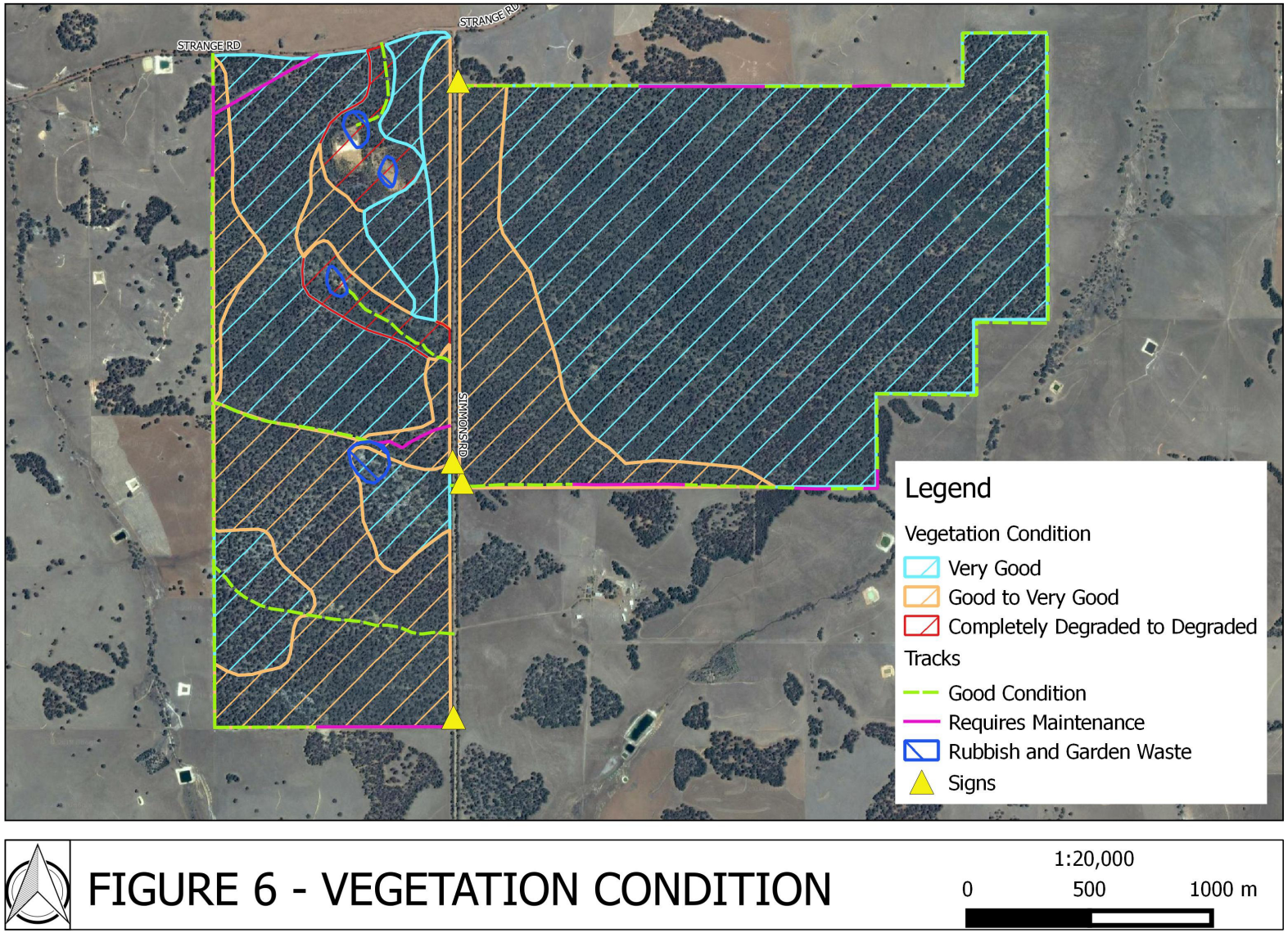

FIGURE 6 - VEGETATION CONDITION

1:20,000

0 500 1000 m

APPENDIX A
FLORA SPECIES RECORDED

Appendix A: Flora species recorded at Simmons Rd Nature Reserve in November 2017 and March 2018.

Flora Species known to occur in a 5km radius of the site	Sighted
**Acacia lasiocalyx*	X
**Bromus sp*	X
**Ursinia anthemoides*	X
Acacia sp 2	X
Acacia accuminata	X
Acacia applanata	
Acacia celastrifolia	X
Acacia pulchella	X
Acacia sp	X
Adenanthos ? cygnorum subsp. chamaephyton	X
Adenanthos cygnorum (Woolly Bush)	X
Allocasuarina humilis (Dwarf Sheoak)	X
Astroloma epacridis	
Astroloma sp	X
Austrostipa ?hemipogon	X
Austrostipa elegantissima	X
Austrostipa flavensens	X
Austrostipa hemipogon	X
Banksia armata	X
Banksia nivea	X
Banksia proteoides	X
Banksia sessilis (Parrot Bush)	X
Banksia squarrosa (Pingle)	X
Boronia cymosa (Granite Boronia)	X
Bossiaea eriocarpa	X
Bossiaea ornata (Broad Leaved Brown Pea)	X
Caladenia barbarossa (Dragon Orchid)	
Caladenia discoidea (Dancing Orchid)	
Caladenia flava subsp. late red (G. Brockman GBB 2381)	
Caladenia hirta subsp. rosea	
Caladenia longiclavata (Clubbed Spider Orchid)	
Caladenia macrostylis (Leaping Spider Orchid)	
Caladenia uliginosa subsp. candicans	
Calochilus stramenicola	
Calothamnus sanguineus	X
Chorizema dicksonii (Yellow-eyed Flame Pea)	
Conospermum sp	X
Conostylis pusilla	
Corymbia calophylla (Marri)	X
Cyanicula sericea	
Dampiera obliqua	
Daviesia decurrens	X
Daviesia sp	X
Delma grayii	
Dianella revoluta	X

Diplodactylus granariensis	
Diplolaena graniticola	
Diuris brumalis	
Diuris porrifolia	
Eucalyptus accedens (Powderbark Wandoo)	X
Eucalyptus decurva (Slender Mallee)	
Eucalyptus rudis (Flooded Gum, Kulurda)	
Eucalyptus wandoo (Wandoo)	X
Euclyptus marginata (Jarrah)	X
Gahnia australis	
Gastrolobium hookeri	
Gastrolobium parvifolium (Berry Poison)	
Gastrolobium praemorsum	
Gehyra variegata	
Gompholobium knightianum	X
Grevillea monticola	
Grevillea quercifolia (Oak-leaf Grevillea)	
Grevillea tenuiflora (Tassel Grevillea)	
Hakea lissocarpha	X
Hakea ruscifolia	X
Hemigenia sp	X
Hibbertia commutata	X
Hibbertia glomerata subsp. wandoo P3	
Hibbertia hemignosta	
Hibbertia hypericoides	X
Hibbertia sp	X
Hovea chorizemifolia	X
Hypocalymma angustifolium	X
Isopogon sp	X
Kennedia sp	X
Lepidosperma leptostachyum	X
Lepidosperma squamatum	X
Leptospermum erbuscens	X
Lerista distinguenda	
Leschenaultia biloba	X
Leucopogon sp	X
Linum marginale (Wild Flax)	
Logania micrantha	
Lomandra sp	X
Lomandra spartea	
Loxocarya flexuosa	X
Macrozamia reideli	X
Marianthus sp	X
Millotia tenuifolia var. tenuifolia (Soft Millotia)	
Neurachne alopecuroides	X
Patersonia occidentalis	X
Patersonia pygmea	X
Persoonia sp	X

Petrophile serruriae	X
Petrophile sp	X
Petrophile striata	
Pheladenia deformis	
Philotheca nodiflora subsp. latericola	
Podilepis sp	X
Prasophyllum gracile	
Pterostylis concava	
Pterostylis recurva (Jug Orchid)	
Pultenaea pauciflora (Narrogin Pea) T	
Scaevola platyphylla	X
Stackhousia monogyna	X
Stylidium ciliatum (Golden Triggerplant)	
Stylidium hortiorum	
Stylidium paulineae	
Stylidium repens	X
Stylidium sp	X
Synaphea cuneata	
Synaphea decorticans	
Synaphea pandurata P3	
Synaphea sp	X
Tetraria octandra	
Tetraria sp. Jarrah Forest (R. Davis 7391)	
Thelymitra antennifera (Vanilla Orchid)	
Thysanotus sparteus	X
Velleia trinervis	
Xanthorrhoea preissii (Grass tree, Balga)	X

APPENDIX B
FAUNA SPECIES RECORDED

Appendix B: fauna species recorded at Simmons Rd Nature Reserve in November 2017 and March 2018

Fauna Species known to occur in a 5km radius of the site	Sighted	Evidence on site
Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)		
Acanthiza chrysorrhoa (Yellow-rumped Thornbill)		
Acanthorhynchus superciliosus (Western Spinebill)		
Anthochaera carunculata (Red Wattlebird)		
Anthochaera lunulata (Western Little Wattlebird)		
Barnardius zonarius	X	
Calyptorhynchus banksii (Red tailed Black Cockatoo)	X	
Canis lupus (Dog)		X
Cercartetus concinnus (Western Pygmy-possum, Mundarda)		
Chrysococcyx basalis (Horsfield's Bronze Cuckoo)		
Colluricincla harmonica (Grey Shrike-thrush)		
Coracina novaehollandiae (Black-faced Cuckoo-shrike)		
Corvus coronoides (Australian Raven)		
Cracticus tibicen (Australian Magpie)	X	
Crinia pseudinsignifera (Bleating Froglet)		
Dacelo novaeguineae (Laughing Kookaburra)		
Delma grayii		
Diplodactylus granariensis		
Falco berigora (Brown Falcon)		
Falco cenchroides (Australian Kestrel, Nankeen Kestrel)		
Felis catus (Domestic Cat)		
Gehyra variegata		
Gerygone fusca (Western Gerygone)		
Grallina cyanoleuca (Magpie-lark)		
Heleioporus albopunctatus (Western Spotted Frog)		
Hirundo neoxena (Welcome Swallow)		
Idiosoma nigrum (Shield-backed Trapdoor Spider) T 55. 8844 Isopogon crithmifolius		
Lerista distinguenda		
Lichmera indistincta (Brown Honeyeater)		
Macropus fuliginosus (Western Grey Kangaroo)	X	
Macropus irma (Western Brush Wallaby) P4	X	
Malurus cyaneus (Blue Wren)		
Malurus pulcherrimus (Blue-breasted Fairy-wren)		
Melithreptus brevirostris (Brown-headed Honeyeater)		
Merops ornatus (Rainbow Bee-eater) IA		
Millotia tenuifolia var. tenuifolia (Soft Millotia)		
Ocyphaps lophotes (Crested Pigeon)		
Oryctolagus cuniculus (European Rabbit)		X
Pachycephala rufiventris (Rufous Whistler)		
Pardalotus striatus (Striated Pardalote)		
Petroica boodang (Scarlet Robin)		
Petroica goodenovii (Red-capped Robin)		
Phaps chalcoptera (Bronzewing pigeon)	X	
Phaps chalcoptera (Common Bronzewing)		
Phylidonyris niger (White-cheeked Honeyeater)		
Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)	X	
Rhipidura leucophrys (Willie Wagtail)		
Sericornis frontalis (White-browed Scrubwren)		
Smicrornis brevirostris (Weebill)		
Sminthopsis gilberti (Gilbert's Dunnart)		
Tachyglossus aculeatus (short-beaked echidna)		X
Underwoodisaurus milii (Barking Gecko)		
Vulpes vulpes (Red Fox)		X
Zosterops lateralis (Grey-breasted White-eye, Silvereye)		