



Main Roads Western Australia

**Tonkin Highway Corridor (Roe Highway to Kelvin Road)
Targeted Flora and Black Cockatoo Hollow Assessment**

February 2021

Executive summary

Tonkin Highway services the Kewdale industrial area as a strategic freight route and the Perth Airport as a tourist and inter-town route. Main Roads Western Australia (Main Roads) is proposing to improve the efficiency of the Tonkin Highway and its arterial roads, Welshpool Road, Hale Road and Kelvin Road through the construction of grade separated interchanges (the Proposal).

GHD Pty Ltd (GHD) was commissioned by Main Roads to undertake targeted flora surveys and a Black Cockatoo tree hollow assessment, to supplement the Woodman Environmental Consulting Pty Ltd (Woodman) biological survey findings (Woodman 2020). The outcome of the survey(s) will be used to inform the environmental impact assessment (EIA) and approvals process.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.6 and the assumptions and qualifications contained throughout the Report.

Significant flora results

An area of 115.8 ha was searched for significant flora. An additional four individuals of one significant flora taxon, *Johnsonia pubescens* subsp. *cygnorum* (Priority 2), was recorded from four locations.

No individuals of *Caladenia huegelii*, *Diuris purdiei* or *Drakaea elastica* were recorded from the survey area during the survey. Furthermore, there are no changes to the likelihoods of these species, with all three considered unlikely to occur within the survey area.

No other significant flora identified in the desktop searches (in Woodman (2020) or this report) were recorded during the survey. Based on the combined survey effort survey of Woodman (2020) and this survey, all significant flora not previously recorded within the survey area, are considered unlikely to occur post-survey.

Black cockatoo hollow assessment results

Woodman (2020) concluded there were two potential Black Cockatoo breeding trees with potentially suitable hollows. These two Black Cockatoo nest-trees were assessed for hollow suitability and evidence of Black Cockatoo nesting. Of the two trees, one tree (Tree ID 204) contains a suitable hollow for Black Cockatoo nesting. The other tree (Tree ID 281) contains numerous limb spouts that are blocked or in too small a limb to be suitable.

No evidence of hollow use by Black Cockatoos was recorded during the assessment.

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1. Introduction

1.1 Background

Tonkin Highway services the Kewdale industrial area as a strategic freight route and the Perth Airport as a tourist and inter-town route. Main Roads Western Australia (Main Roads) is proposing to improve the efficiency of the Tonkin Highway and its arterial roads, Welshpool Road, Hale Road and Kelvin Road through the construction of grade separated interchanges (the Proposal). The Proposal will reduce potential vehicular conflict and improve traffic times, congestion and vehicle/pedestrian safety.

To inform the environmental impact assessment (EIA) process, Main Roads commissioned Woodman Environmental Consulting Pty Ltd (Woodman) to conduct a biological survey to identify the key flora, fauna, soil, groundwater and surface water values associated with the Proposal. The Woodman (2020) assessment included both desktop and field components, with a Detailed and Targeted flora and vegetation survey, and Black Cockatoo Habitat Assessments over multiple site visits between August 2019 to March 2020.

Woodman (2020) completed searches for significant flora identified in the desktop assessment completed for the Proposal, and observed 11 significant flora in the survey area, comprising four Threatened taxa and seven Priority taxa.

Woodman (2020) recorded all three species of Black Cockatoo and 333 potential Black Cockatoo nest trees. Of the potential Black Cockatoo nest trees, seven were identified as containing hollows. After a camera-pole inspection, only two trees were assessed as potentially containing hollows suitable for Black Cockatoo use with one of these not inspected due to access restrictions.

1.2 Purpose of this report

To supplement and strengthen the Woodman (2020) biological survey findings, GHD Pty Ltd (GHD) was commissioned by Main Roads to undertake a targeted flora survey and Black Cockatoo tree hollow assessment. The outcome of the surveys will be used to inform the environmental impact assessment (EIA) and approvals process.

This report presents the methods and results of the GHD surveys and compares the Woodman (2020) report results in the context of the survey area.

1.3 Proposal location

The Proposal is located in the City of Kalamunda and City of Gosnells, approximately 12 kilometres (km) south-east of the Perth CBD (Figure 1, Appendix A).

The Woodman (2020) assessment encompassed 1,068.98 hectares (ha). However, due to access issues the Woodman (2020) survey focused on the Development Envelope (DE) and blocks of adjacent vegetation, covering 193.64 ha, which is referred to as the 'Assessed Area'.

1.3.1 Survey area

The survey area assessed by GHD was provided by Main Roads and aligns with the areas required for clearing and development (DE) for the Proposal. The survey area extends along Tonkin Highway for approximately 13.4 km, beginning just north of the Hale Road intersection and ending at the Maddington Road intersection. It contains the existing Tonkin Highway and associated arterial roads and extends into patches of existing vegetation adjacent to these roads. The GHD survey area is approximately 115.8 ha (Figure 1, Appendix A).

1.3.2 Study area

For consistency, the study area in this report refers to the area assessed for the desktop assessment undertaken by Woodman (2020).

1.4 Scope of works

The scope of works included a desktop assessment and field survey of the survey area. The following actions were completed to fulfil the scope:

- A desktop review was undertaken with consideration to relevant databases and existing environmental reports for the survey area
- A single season targeted flora survey was conducted to verify desktop assessment findings and record any additional plants that may not have been recorded by Woodman (2020)
- A targeted orchid survey was completed with particular focus on three Threatened orchid species (*Caladenia huegelii*, *Diuris purdiei* and *Drakaea elastica*)
- Trees which contained potential Black Cockatoo suitable hollows identified by Woodman (2020) were assessed for black cockatoo suitability and nesting
- A concise report (this document) was prepared on the findings of the field survey.

1.5 Relevant legislation, conservation codes and background information

In Western Australia (WA) some ecological communities, flora and fauna are protected under both Federal and State Government legislation. In addition, regulatory authorities also provide a range of guidance and information on expected standards and protocols for environmental surveys.

An overview of key legislation and guidelines, conservation codes and background information relevant to this survey is provided in Appendix B.

1.6 Report limitations and assumptions

This report has been prepared by GHD for Main Roads and may only be used and relied on by Main Roads for the purpose agreed between GHD and the Main Roads as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Main Roads arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report (including species listings). GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Main Roads and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept

liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of access tracks, operational works, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of the field survey. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

This report has assessed targeted flora and black cockatoo potential breeding habitat within the GHD survey area (Figure 1, Appendix A). Should the GHD survey area change or be refined, further assessment may be required.

2. Significant flora

2.1 Methodology

2.1.1 Desktop

Prior to the commencement of the field survey, a desktop assessment was undertaken to identify relevant environmental information pertaining to the study area and to assist in survey design. The desktop assessment included a review of the following:

- *Tonkin Grade Separated Interchanges Biological Survey and Targeted Black Cockatoo Habitat Assessment* (Woodman 2020) to assess the likelihood of occurrence (LOO) of significant flora in the study area and inform the survey effort.
- The Department of the Agriculture, Water and Environment (DAWE) Protected Matters Search Tool (Appendix C) to identify species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) potentially occurring within the study area not previously identified by Woodman (2020)
- The Department of Biodiversity, Conservation and Attractions (DBCA) *NatureMap* (Appendix C) and Threatened (Declared Rare) and Priority Flora databases (TPFL and WAHERB) to identify significant species listed under the *Biodiversity Conservation Act 2016* (BC Act) or listed as Priority by DBCA not previously identified by Woodman (2020)
- Previous records, habit and habitat information for target orchids *Caladenia huegelii*, *Diuris purdiei* and *Drakaea elastica*.

Although Woodman (2020) determined *Caladenia huegelii*, *Diuris purdiei* and *Drakaea elastica* were all unlikely to occur in the DE, these orchid species were listed in the additional information required for preliminary documentation for the Tonkin Highway Grade Separated Interchanges in Wattle Grove (EPBC Ref: 2019/8529). Given this and to strengthen the Woodman (2020) results, Main Roads requested they be considered as part of this survey.

The results of the desktop assessment were reviewed, and a target list of significant flora were identified. This included species identified in the desktop searches, significant flora recorded by Woodman during their survey or identified by Woodman as likely or possible to occur in the survey area (Woodman 2020). Refer to section 2.2.1 for the list of flora.

Prior to the field survey, the results of the Woodman (2020) survey were used to identify locations where significant flora had been previously recorded in the survey area. Vegetation mapping (type and condition) was also examined to refine search areas and proposed survey intensity.

2.1.2 Field survey

GHD botanists Joel Collins (FB62000200) and Erin Lynch (FB62000081-2) completed a single season targeted flora survey in early spring on 2 and 3 September 2020. Joel Collins and GHD botanist Sarah Flemington (FB62000202) later re-surveyed the area on 5 and 6 November 2020. The targeted surveys were undertaken in early and late Spring to coincide with the flowering period of the majority of the target taxa. The November survey aimed to capture flora that may have been late in flowering and not identified during the early spring survey.

Based on the significant flora to be targeted (including orchids), vegetation mapping completed for the Proposal and previous survey results and effort, GHD employed a sampling method involving walking traverses spaced approximately 10 metres (m) apart in areas of Good to Degraded vegetation or better. Some areas containing narrow strips of vegetation adjacent

cleared areas for road and paths were not surveyed at 10 m intervals. Traverse spacing equated to a 5 m search area either side of the walked traverse, which was deemed sufficient intensity for the taxa targeted. This spacing also aligns with guidance provided in *Draft Survey Guidelines for Australia's Threatened Orchids* (Commonwealth of Australia 2013). Tracks were recorded using a handheld GPS unit. Survey effort for the targeted flora survey is shown on Figure 2, Appendix A.

As the purpose of the targeted flora survey was to search for and record significant flora taxa, additional information along each traverse such as descriptive location, landform, aspect, soils and vegetation condition was not recorded. This information has already been captured for the survey area as part of detailed vegetation and flora surveys completed and reported on by Woodman (2020).

Where significant flora taxa were identified the locations and number of plants present were recorded using Samsung Tablets on a mapping application. Additional data was collected to support the lodgement of a Threatened and Priority Flora Report Form.

The survey methodology employed by GHD was undertaken with reference to the Environmental Protection Authority (EPA) Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016).

2.1.3 Limitations

The EPA (2016) state flora survey reports for environmental impact assessment in WA should contain a section describing the limitations of the survey methods used. The limitations and constraints associated with the targeted flora survey are discussed in Table 1.

Table 1 Flora survey limitations

| Aspect | Constraint | Comment |
|--|------------|---|
| Sources of information and availability of contextual information. | Nil | Adequate information is available for the GHD survey area, this includes Woodman (2020) and other publicly available databases. |
| Scope (what life forms were sampled etc.) | Nil | Significant vascular flora were sampled during the survey. Non-vascular flora were not surveyed. |
| Proportion of flora collected and identified (based on sampling, timing and intensity) | Minor | This survey was a targeted flora survey that focused on significant flora identified in the desktop assessment. Survey timing was adequate to identify most of the target significant flora taxa. Surveys for <i>Drakeaea elastica</i> are ideal and preferred between June and August when the leaf is new (DEC 2009), but can also be surveyed during the flowering period (late September and early November) (Department of the Environment 2013). |
| Flora determination | Nil | Flora determination was undertaken by GHD ecologists in the field and at the WA Herbarium. No collections or samples were taken that could not be identified. The taxonomy and conservation status of the WA flora is dynamic. This report was prepared with reliance on taxonomy and conservation status current at the time of report development, but it should be noted this may change in response to ongoing research and review of the International Union for Conservation Nature criteria. |
| Completeness and further work which might be needed (e.g. | Minor | The GHD survey area was accessed with no restrictions and sufficiently surveyed for the purpose of the survey for majority of the survey area. Traverses undertaken for targeting the orchids were in some small areas not |

| Aspect | Constraint | Comment |
|--|------------|---|
| was the relevant area fully surveyed) | | undertaken at intervals of 10 m. This may have reduced the detectability of orchid species in these areas. |
| Mapping reliability | Minor | Data was recorded in the field using hand-held GPS tools (e.g. Samsung tablet and Garmin GPS). Certain atmospheric factors and other sources of error can affect the accuracy of GPS receivers. The GPS units used for this survey are accurate to within ± 5 metres on average. Therefore the data points consisting of coordinates recorded from the GPS may contain inaccuracies. |
| Timing/weather/season/cycle | Minor | Multiple targeted flora surveys were completed in early and late spring to capture the flowering period for the majority of the target taxa. An assessment of the Bureau of Meteorology (BoM) climate data from the Perth Metro weather station (#9225) in 2020 (BoM 2020) depict higher than average rainfall in November (92 mm / 24.2 mm), but lower than average in August – October (183.2 mm / 244.8 mm). September incurred only 4.9 mm less than the long-term average for that month. The weather conditions during the survey did not impact the survey. The survey timings were considered appropriate for the flora field surveys. |
| Disturbances (e.g. fire, flood, accidental human intervention) | Nil | It was evident in the survey area that there was significant impact to vegetation composition and structure due to human activities resulting in cleared areas either fragmented or void of all vegetation, and high levels of introduced (weed) taxa. Some areas of vegetation had been burnt within the last 5 years, particularly the area between Tonkin Highway and the Hartfield Golf Club. The detection of significant flora was not impacted by the disturbances. |
| Resources | Nil | Adequate resources were employed during the field survey. GHD (2020) employed 8 person days for the targeted flora surveys. |
| Access restrictions | Nil | There were no access issues relating to the GHD (2020) survey area. |
| Experience levels | Nil | The GHD ecologists/botanists who undertook the surveys are all suitably qualified in their respective fields. Joel Collins is a senior botanist with over 17 years' experience in undertaking flora and vegetation surveys on the Swan Coastal Plain. Joel Collins has undertaken numerous targeted Threatened orchid surveys on the Swan Coastal Plain and is highly familiar with the species taxonomy and habitat requirements. Joel has previously surveyed and recorded Threatened <i>Drakaea</i> sp. south of Perth in the Bunbury area at several locations during the flowering period over numerous years. Erin Lynch is a senior botanist with 13 years' experience in undertaking ecological surveys on the Swan Coastal Plain and has previously undertaken targeted flora and Threatened orchid surveys. Sarah Flemington is an experienced ecologist with 4 years' experience undertaking ecological surveys across all the major bioregions in WA, including the Swan Coastal Plain. |

2.2 Desktop assessment

2.2.1 Woodman results

Woodman (2020) identified 94 significant flora taxa as occurring within the study area through the desktop assessment. Eleven significant flora taxa were recorded during the Woodman (2020) survey; this comprised four Threatened taxa, one Priority 2 taxon, four Priority 3 taxa and one Priority 4 taxon (Table 2). Of these 11 significant flora, 10 were identified during the Woodman desktop searches with one taxon not identified in the desktop searches.

Table 2 Significant flora recorded by Woodman (2020)

| Taxon | Status | |
|--|----------------|--------------------|
| | State (BC Act) | Federal (EPBC Act) |
| <i>Andersonia gracilis</i> | Vulnerable | Endangered |
| <i>Banksia mimica</i> | Vulnerable | Endangered |
| <i>Conospermum undulatum</i> | Vulnerable | Vulnerable |
| <i>Tetraria australiensis</i> | Vulnerable | Vulnerable |
| <i>Johnsonia pubescens</i> subsp. <i>cygnorum</i> | Priority 2 | |
| <i>Byblis gigantea</i> | Priority 3 | - |
| <i>Isopogon autumnalis</i> | Priority 3 | |
| <i>Jacksonia gracillima</i> | Priority 3 | |
| <i>Lasiopetalum bracteatum</i> | Priority 4 | |
| <i>Styphelia filifolia</i> | Priority 3 | |
| <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i> | Priority 4 | |

Woodman (2020) assessed the LOO post-survey of significant flora identified in their desktop assessment. With the exception of those taxa recorded during the survey, all remaining significant flora were considered as Unlikely to occur.

2.2.2 Desktop searches

A review of the search results from the EPBC Act Protected Matters Search Tool, DBCA NatureMap database and DBCA Threatened (Declared Rare) and Priority Flora databases (TPFL and WAHERB) did not identify any additional significant flora taxa that were not previously identified by Woodman (2020) in their desktop searches.

2.2.3 Target orchids

The three target orchid species include *Caladenia huegelii*, *Diuris purdiei* and *Drakaea elastica*, which are listed as Endangered under the EPBC Act and Threatened under the BC Act. Woodman (2020) concluded the three orchid species as Unlikely to occur within the DE (aligns with the survey area considered for this assessment) due to no suitable habitat present. However, Woodman (2020) noted in their report that *Diuris purdiei* may possibly occur in the broader Woodman (2020) survey area as suitable habitat is present.

The habitat and flowering period of *Caladenia huegelii*, *Diuris purdiei* and *Drakaea elastica* are summarised in Table 3 below.

Table 3 Threatened orchid information

| Taxon | Flowering period | Habitat |
|---------------------------|----------------------|---|
| <i>Caladenia huegelii</i> | August to October | Grey sand, Bassendean dunes |
| <i>Diuris purdiei</i> | September to October | Grey-black sand, moist. Winter-wet swamps |

| Taxon | Flowering period | Habitat |
|-------------------------|-----------------------|--|
| <i>Drakaea elastica</i> | September to November | White or grey sand. Low-lying situations adjoining winter-wet swamps |

2.3 Survey results

Four additional individuals of one significant flora taxon within the survey area, *Johnsonia pubescens* subsp. *cygnorum* (Priority 2) was recorded during the survey. The location of the *Johnsonia pubescens* subsp. *cygnorum* is shown on Figure 3 Appendix A.

Johnsonia pubescens subsp. *cygnorum*

Johnsonia pubescens subsp. *cygnorum* is a tufted perennial herb to 0.25 m high with white-green flowers in September. The species grows on flats and seasonally-wet sites with grey-white sand, sandy-clay with laterite gravel (WA Herbarium 1998–) (Plate 1).

Johnsonia pubescens subsp. *cygnorum* was recorded from 4 locations (4 plants). Three individuals were recorded in the north of the survey area, in a patch of vegetation south of Hale Road on the western side of Tonkin Highway, adjacent to Hartfield Park. One (1) other individual was recorded north of Kelvin Road on the west of Tonkin Highway in a narrow strip of vegetation near the highway. These records are in addition to the Woodman (2020) survey results, where 282 individuals of this species were recorded in their Assessed Area.



Plate 1 *Johnsonia pubescens* subsp. *cygnorum* in situ

Target orchids

No individuals of *Caladenia huegelii*, *Diuris purdiei* or *Drakaea elastica* were recorded during the field survey. GHD completed a targeted orchid survey in Kemerton (north of Bunbury) and recorded *D. elastica* with flower buds in mid August 2020, these plants would start to flower in early September and would be highly detectable as the flower is also prominent for an experienced Botanist during the 2 and 3 September survey, if present.

There are no changes to the likelihoods of these three species as reported by Woodman (2020). Suitable habitat for *Caladenia huegelii*, *Diuris purdiei* and *Drakaea elastica*, was not identified by GHD within the survey area as was also determined by Woodman (2020) during their survey. Both the Woodman and GHD surveys have provided substantial evidence that the Threatened orchid species are Unlikely to occur in the survey area when considering that suitable survey

effort over multiple surveys has been undertaken during the preferred survey timing for species detection.

Other significant flora

No other significant flora identified in the desktop searches (in Woodman (2020) or by GHD) were recorded during the survey. The extensive, multiple-season surveys undertaken by Woodman (2020) suggest that the detectability of significant flora identified in the desktop assessment as Possible to occur in the survey area (pre-survey) was high. Based on the combined survey effort survey of Woodman (2020) and this survey, significant flora not previously recorded within the GHD survey area, are considered Unlikely to occur post-survey.

3. Black Cockatoo hollow assessment

3.1 Methodology

3.1.1 Desktop

Prior to the field survey, a review of the *Tonkin Grade Separated Interchanges Biological Survey and Targeted Black Cockatoo Habitat Assessment* (Woodman 2020) was undertaken to identify trees that have potential Black Cockatoo hollows. These trees were the focus of the Black Cockatoo hollow assessment.

Based on Woodman (2020), Black Cockatoo potential breeding trees with potentially suitable hollows for Black Cockatoo included trees with a nest tree rank category of 1, 2 or 3. Refer to Appendix D for a description of each nest tree rank category.

3.1.2 Field survey

GHD Principal zoologist Glen Gaikhorst completed a Black Cockatoo hollow assessment on 9 December 2020. The assessment involved re-locating the two relevant Woodman (2020) Black Cockatoo potential breeding trees and inspecting the hollows via binoculars and a pole camera (NestView PoleCam. Model NV4 Faunatech).

The Black Cockatoo hollow assessment was conducted with reference to the *EPBC Act referral guidelines for three threatened black cockatoo species* (Department of Sustainability, Environment, Water, Populations, and Communities (DSEWPaC) 2012).

3.1.3 Limitations

The EPA (2020) state that fauna survey reports for environmental impact assessment in WA should contain a section describing the limitations of the survey methods used. The limitations and constraints associated with the Black Cockatoo hollow assessment are discussed in Table 4.

Table 4 Black Cockatoo hollow assessment limitations

| Aspect | Constraint | Comment |
|---|------------|---|
| Sources of information and availability of contextual information. | Nil | Adequate information is available for the GHD survey area, this includes Woodman (2020) and other publicly available databases. |
| Scope (what life forms were sampled etc.) | Nil | Black Cockatoo potential breeding trees with potentially suitable hollows were assessed. |
| Proportion of fauna identified, recorded and/or collected | Nil | Not applicable. |
| Completeness and further work which might be needed (e.g. was the relevant area fully surveyed) | Nil | GHD assessed Black Cockatoo potential breeding trees with potentially suitable hollows as determined by Woodman (2020). This included trees with a nest tree rank category of 1, 2 or 3 (Woodman 2020). |
| Resources | Nil | Adequate resources were employed during the field survey. GHD employed 0.5 person days for the Black Cockatoo hollow assessment. |

| Aspect | Constraint | Comment |
|---------------------|------------|---|
| Access restrictions | Nil | There were no access issues relating to the Black Cockatoo hollow assessment. |
| Experience levels | Nil | Glen Gaikhorst is Principal Zoologist and has over 24 years' experience undertaking ex and in-situ management of all faunal groups. Glen has undertaken numerous targeted Black Cockatoo assessments and very familiar with Black Cockatoo evidence and hollow use. |

3.2 Desktop assessment

Woodman (2020) identified 333 potential Black Cockatoo nest-trees from six species within their Assessed Area. These trees were assigned a rank category reflecting their likely value for breeding with respect to likelihood or presence of hollows. Of these 333 potential Black Cockatoo nest-trees, seven were assigned a ranking of 2 or 3. A follow up survey using a pole camera was used by Woodman (2020) to assess the hollows located in the seven category 2 and 3 trees identified in the survey area. A summary of the pole-camera inspection results by Woodman (2020) is provided in Table 5. The inspection resulted in the revised rank of five trees. The remaining two trees (Tree ID 204 and 281) could not be adequately assessed, and therefore their ranks could not be revised.

The two trees not assessed (Tree ID 204 and 281) were the focus of this Black Cockatoo hollow assessment.

Table 5 Summary results from the pole camera inspection of potential Black-Cockatoo Nest-trees (taken from Woodman (2020))

| Date | Tree ID | Tree species | DBH (mm) | Status | Initial Rank | Inspection notes | Revised Rank |
|-----------|---------|-------------------|----------|--------|--------------|--|--------------|
| 7/10/2019 | 182 | Jarrah | 1300 | Alive | 3 | No suitable hollow. Active beehive in base of tree | 4 |
| 7/10/2019 | 184 | Stag | 1400 | Dead | 2 | No suitable hollows | 4 |
| 7/10/2019 | 199 | Stag | 900 | Dead | 3 | Two hollows were inspected – hollows appear too shallow and active beehive in base of tree | 5 |
| 7/10/2019 | 204 | Coastal Blackbutt | 900 | Alive | 2 | Tree on private property. Not inspected | NA |
| 8/10/2019 | 279 | Coastal Blackbutt | 800 | Alive | 3 | Not a hollow | 5 |
| 8/10/2019 | 281 | Stag | 1400 | Dead | 3 | Hollow at end of upright branch appears to shallow. Other hollows inaccessible due to trees blocking access and therefore inconclusive | NA |
| 8/10/2019 | 304 | Flooded Gum | 600 | Alive | 2 | Hollows appear too shallow. Active beehive in base of tree | 4 |


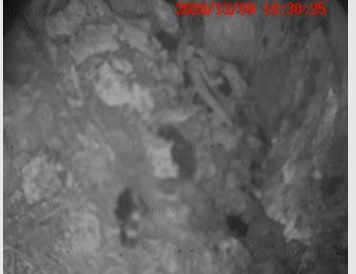
3.3 Survey results



Two Black Cockatoo nest-trees were assessed for hollow suitability and evidence of Black Cockatoo nesting. Of the two trees assessed, one tree (Tree ID 204) contains a suitable hollow for Black Cockatoo nesting. This tree trunk is located on private property, which is outside the DE; however, the foliage canopy and upper trunk and branches extend into and over the DE. There were no signs of chews around the hollow consistent with Black Cockatoo use. Chews present around the entrance of the hollow reported by Woodman (2020) suggest other parrots,

such as Galah or Lorikeet, have used the hollow, but there is no evidence of historic Black Cockatoo use.

The other tree (Tree ID 281) contains numerous limb spouts that are blocked or in too small a limb to be suitable for Black Cockatoo use. No evidence of hollow use by Black Cockatoos was recorded during the assessment. A summary of the findings is presented in Table 6.

Table 6 Black Cockatoo nest-trees hollow assessment

| Date | Tree ID | Easting | Northing | Tree Species | DBH (mm) | Initial Ranking (Woodman 2020) | Pole Camera inspection | Revised Rank | Images Tree | Hollow |
|---------|---------|---------|----------|-------------------------|----------|--------------------------------|---|--------------|---|---|
| 9/12/20 | 204 | 405715 | 6456658 | Coastal Blackbutt Alive | 900 | 2 | This tree is outside of the DE on private land, but the tree canopy and branches extend into and over the DE. One hollow with a suitable (15 cm) entrance size for Black Cockatoos at 8 m high. Hollow approx. 20 cm deep with no signs of been worked by Black Cockatoos. The chews previously recorded by Woodman (2020) suggest other parrots, such as Galah or Lorikeet, have previously used the hollow. | 4 |  |  |

| Date | Tree ID | Easting | Northing | Tree Species | DBH (mm) | Initial Ranking (Woodman 2020) | Pole Camera inspection | Revised Rank | Images Tree | Hollow |
|---------|---------|---------|----------|--------------------------------|----------|--------------------------------|--|--------------|---|---|
| 9/12/20 | 281 | 405267 | 6458969 | Stag-Jarrah Partially alive | 1400 | 3 | Numerous limb spouts appear to be hollow but are all blocked or in too small a limb to be suitable. Others are facing down or split and not suitable for Black Cockatoos. No evidence of chews recorded. | 4 |  |  |

4. References

Bureau of Meteorology (BoM) 2020, *Climate Data Online*, retrieved December 2020, from <http://www.bom.gov.au/climate/data/?ref=ftt>

Commonwealth of Australia 2013. Draft Survey Guidelines for Australia's Threatened Orchids Guidelines for detecting orchids listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999.

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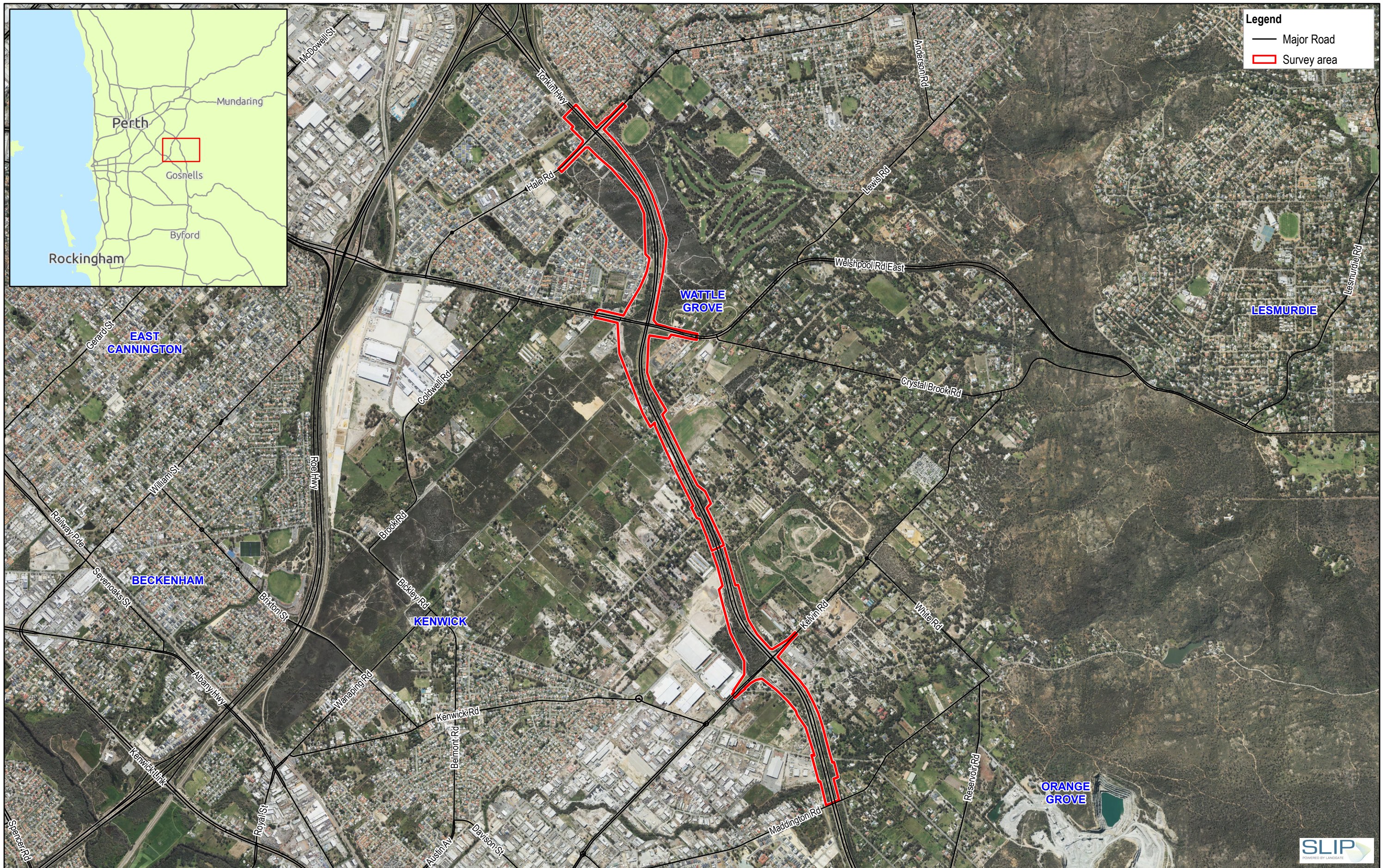
Appendices

Appendix A – Figures

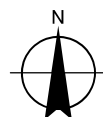
Figure 1 Proposal area and survey area boundary

Figure 2 Survey effort

Figure 3 Conservation significant flora survey records and Black Cockatoo trees



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Main Roads
Tonkin Highway Corridor
(Roe Hwy to Kelvin Rd)
Targeted Flora and
Black Cockatoo Assessment

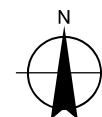
Proposal area and survey area boundary

Project No. 12535007
Revision No. 0
Date 28/01/2021

FIGURE 1



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Main Roads
Tonkin Highway Corridor
(Roe Hwy to Kelvin Rd)
Targeted Flora and
Black Cockatoo Assessment

Survey effort

Project No. **12535007**
Revision No. **0**
Date **28/01/2021**

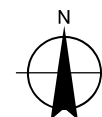
FIGURE 2-1

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Main Roads
Tonkin Highway Corridor
(Roe Hwy to Kelvin Rd)
Targeted Flora and
Black Cockatoo Assessment

Survey effort

Project No. **12535007**
Revision No. **0**
Date **28/01/2021**

FIGURE 2-2



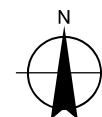
Legend

- Major Road
- Minor Road
- Survey efforts
- Survey area

| | | | | |
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| <p>Paper Size ISO A3</p> <p>0 25 50 75 100</p> <p>Meters</p> | | | <p>Main Roads Tonkin Highway Corridor (Roe Hwy to Kelvin Rd) Targeted Flora and Black Cockatoo Assessment</p> | <p>Project No. 12535007 Revision No. 0 Date 28/01/2021</p> |
| <p>Survey effort</p> | | | | <p>FIGURE 2-3</p> |



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**Main Roads
Tonkin Highway Corridor
(Roe Hwy to Kelvin Rd)
Targeted Flora and
Black Cockatoo Assessment**

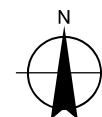
Survey effort

Project No. **12535007**
Revision No. **0**
Date **28/01/2021**

FIGURE 2-4



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**Main Roads
Tonkin Highway Corridor
(Roe Hwy to Kelvin Rd)
Targeted Flora and
Black Cockatoo Assessment**

Survey effort

Project No. 12535007
Revision No. 0
Date 28/01/2021

FIGURE 2-5

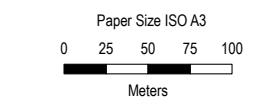
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Legend

- Major Road
- Minor Road
- Survey efforts
- Survey area

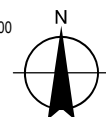
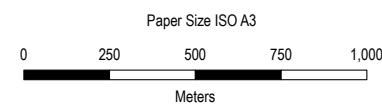
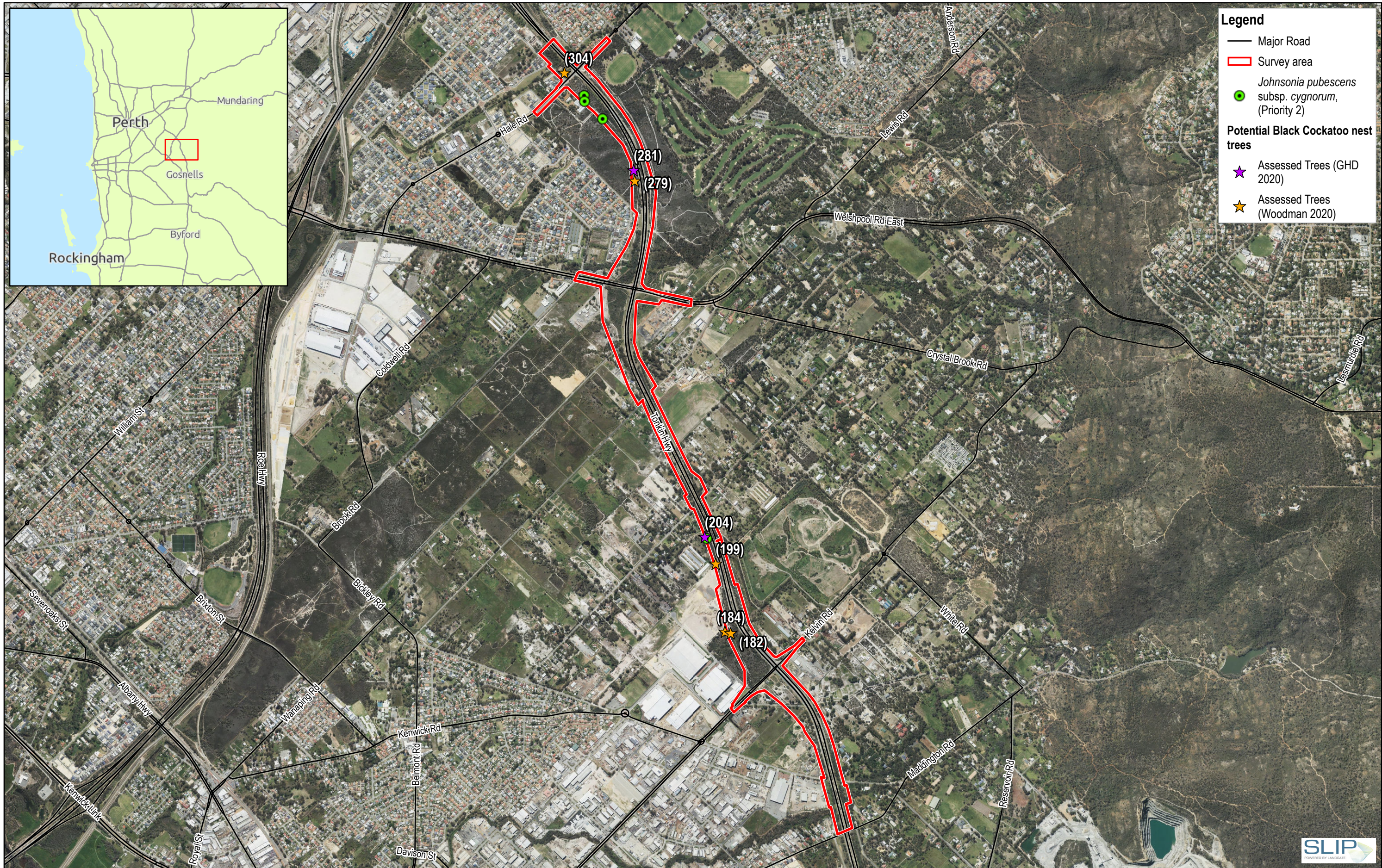


Main Roads
Tonkin Highway Corridor
 (Roe Hwy to Kelvin Rd)
Targeted Flora and
Black Cockatoo Assessment

Survey effort

Project No. **12535007**
 Revision No. **0**
 Date **28/01/2021**

FIGURE 2-6



Main Roads
Tonkin Highway Corridor (Roe Hwy to Kelvin Rd)
Targeted Flora and Black Cockatoo Assessment

Conservation significant flora survey
records and Black Cockatoo trees

Project No. 12535007
Revision No. 0
Date 28/01/2021

FIGURE 3

Appendix B – Relevant legislation, background information and conservation code

Relevant legislation

Federal *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Federal Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as Matters of National Environmental Significance (MNES).

The biological aspects listed as MNES include:

- Nationally threatened flora and fauna species and ecological communities
- Migratory species

A person must not undertake an action that has, will have, or is likely to have a significant impact (direct or indirect) on MNES, without approval from the Federal Minister for the Environment.

The EPBC Act is administered by the Department of Agriculture, Water and the Environment (DAWE).

State *Biodiversity and Conservation Act 2016*

The *Biodiversity Conservation Act 2016* (BC Act) provides for the conservation and protection of biodiversity and biodiversity components, as well as the promotion of the ecologically sustainable use of biodiversity components in Western Australia. The BC Act replaces both the repealed *Wildlife Conservation Act 1950* (WC Act) and the *Sandalwood Act 1929* (Sandalwood Act), as well as their associated regulations. To attain the objectives of the BC Act, principles of ecological sustainable development have been established:

- Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- The conservation of biodiversity and ecological integrity should be a fundamental consideration in decision-making
- Improved valuation, pricing and incentive mechanisms should be promoted.

The BC Act is administered by the Department of Biodiversity Conservation and Attractions (DBCA).

Conservation codes

Species of significant flora, fauna and communities are protected under both Federal and State Acts. The Federal EPBC Act provides a legal framework to protect and manage nationally important flora and communities. The State BC Act is the primary wildlife conservation legislation in Western Australia. Information on the conservation codes is summarised in the following sections.

Flora and fauna

Conservation significant flora and fauna

Species of significant flora are protected under both Federal and State legislation. Any activities that are deemed to have a significant impact on species that are recognised by the EPBC Act, and/or the BC Act can warrant referral to the DAWE and/or the EPA.

The Federal conservation level of flora and fauna species and their significance status is assessed under the EPBC Act. The significance levels for flora and fauna used in the EPBC Act align with the International Union for Conservation of Nature (IUCN) Red List criteria, which are internationally recognised as providing best practice for assigning the conservation status of species. The EPBC Act also protects land and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II)
- Migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China–Australia Migratory Bird Agreement (CAMBA)
- Native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the republic of Korea–Australia Migratory Bird Agreement (ROKAMBA)

The State conservation level of flora and fauna species and their significance status also follows the IUCN Red List criteria. Under the BC Act flora and fauna can be listed as Threatened, Extinct and as Specially Protected species.

Threatened species are those are species which have been adequately searched for and are deemed to be, in the wild, either rare, under identifiable threat of extinction, or otherwise in need of special protection, and have been gazetted as such. The assessment of the conservation status of Threatened species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria. Specially protected species meet one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection. Species that are listed as Threatened or Extinct species under the BC Act cannot also be listed as Specially Protected species.

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

For the purposes of this assessment, all species listed under the EPBC Act, BC Act and DBCA Priority species are considered conservation significant.

Conservation categories and definitions for EPBC Act and BC Act listed flora and fauna species

| Conservation category | Definition |
|----------------------------|--|
| Threatened species | |
| Critically Endangered (CR) | <p>Threatened species considered to be “facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines”.</p> <p>Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines.</p> |
| Endangered (EN) | <p>Threatened species considered to be “facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines”.</p> <p>Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines.</p> |
| Vulnerable (VU) | <p>Threatened species considered to be “facing a high risk of extinction in the wild in the medium term future, as determined in accordance with criteria set out in the ministerial guidelines”.</p> <p>Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines.</p> |

Conservation codes for DBCA listed Priority flora and fauna

| Priority category | Definition |
|-------------------|---|
| Priority 1 | <p>Poorly-known taxa</p> <p>Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.</p> |
| Priority 2 | <p>Poorly-known taxa</p> <p>Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.</p> |
| Priority 3 | <p>Poorly-known taxa</p> <p>Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well</p> |

| Priority category | Definition |
|-------------------|--|
| | known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey. |
| Priority 4 | <p>Rare, Near Threatened and other taxa in need of monitoring</p> <p>A. Rare: Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.</p> <p>B. Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>C. Taxa that have been removed from the list of threatened taxa during the past five years for reasons other than taxonomy.</p> |

Other significant flora

Flora species, subspecies, varieties, hybrids and ecotypes may be significant for a range of reasons, other than a statutory listing. The EPA (2016b) states that significant flora may include taxa that have:

- A keystone role in a particular habitat for threatened or Priority flora or fauna species, or large populations representing a considerable proportion of the local or regional total population of a species
- Relictual status, being representation of taxonomic or physiognomic groups that no longer occur widely in the broader landscape
- Anomalous features that indicate a potential new discovery
- Being representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- The presence of restricted subspecies, varieties, or naturally occurring hybrids
- Local endemism (a restricted distribution) or association with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems)
- Being poorly reserved

References

EPA 2016a, *Technical Guide – Flora and Vegetation Surveys for Environmental Impact Assessment*, EPA, Perth, WA.

EPA 2016b, *Environmental Factor Guideline - Flora and Vegetation*, EPA, Perth, WA.

Appendix C – Desktop searches

EPBC Act PMST Report (5 km buffer)

NatureMap Significant Flora Report (5 km buffer)



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

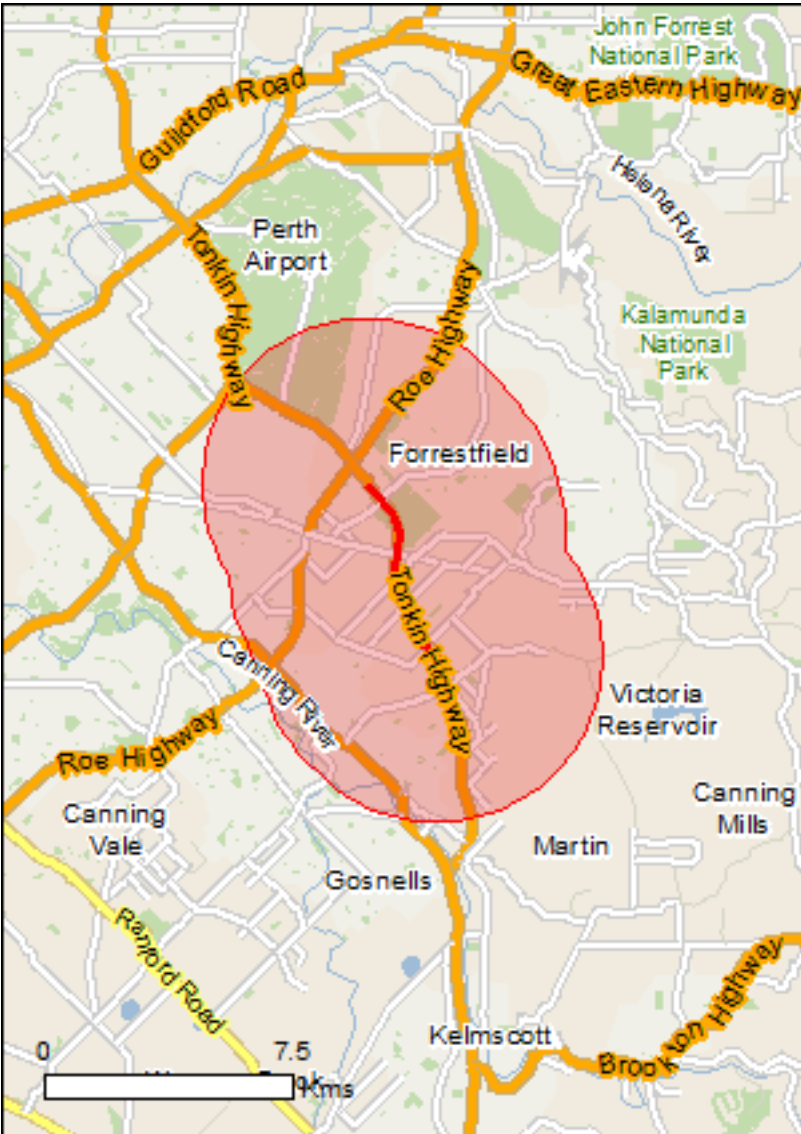
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

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- [Summary](#)
- [Details](#)

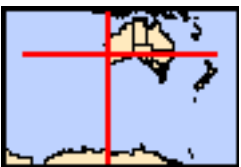
[Matters of NES](#)[Other Matters Protected by the EPBC Act](#)[Extra Information](#)
- [Caveat](#)
- [Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

[Coordinates](#)

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

| | |
|---|------|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance: | 1 |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 4 |
| Listed Threatened Species: | 45 |
| Listed Migratory Species: | 9 |

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

| | |
|--|------|
| Commonwealth Land: | 1 |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 14 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Australian Marine Parks: | None |

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

| | |
|--|------|
| State and Territory Reserves: | 8 |
| Regional Forest Agreements: | 1 |
| Invasive Species: | 42 |
| Nationally Important Wetlands: | 2 |
| Key Ecological Features (Marine) | None |

Details

Matters of National Environmental Significance

| Wetlands of International Importance (Ramsar) | | [Resource Information] |
|--|--|--------------------------|
| Name | | Proximity |
| Forrestdale and thomsons lakes | | Within 10km of Ramsar |

| Listed Threatened Ecological Communities | [Resource Information] |
|--|--------------------------|
|--|--------------------------|

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

| Name | Status | Type of Presence |
|---|-----------------------|---------------------------------------|
| Banksia Woodlands of the Swan Coastal Plain ecological community | Endangered | Community likely to occur within area |
| Clay Pans of the Swan Coastal Plain | Critically Endangered | Community likely to occur within area |
| Corymbia calophylla - Kingia australis woodlands on heavy soils of the Swan Coastal Plain | Endangered | Community known to occur within area |
| Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community | Critically Endangered | Community may occur within area |

| Listed Threatened Species | [Resource Information] |
|---------------------------|--------------------------|
|---------------------------|--------------------------|

| Name | Status | Type of Presence |
|--|-----------------------|--|
| Birds | | |
| Botaurus poiciloptilus Australasian Bittern [1001] | Endangered | Species or species habitat likely to occur within area |
| Calidris ferruginea Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034] | Vulnerable | Species or species habitat known to occur within area |
| Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769] | Endangered | Roosting known to occur within area |
| Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523] | Endangered | Species or species habitat known to occur within area |
| Leipoa ocellata Malleefowl [934] | Vulnerable | Species or species habitat likely to occur within area |
| Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Rostratula australis Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area |
| Sternula nereis nereis Australian Fairy Tern [82950] | Vulnerable | Species or species habitat known to occur |

| Name | Status | Type of Presence within area |
|--|-----------------------|--|
| Insects | | |
| Leioproctus douglasiellus a short-tongued bee [66756] | Critically Endangered | Species or species habitat known to occur within area |
| Mammals | | |
| Bettongia penicillata ogilbyi Woylie [66844] | Endangered | Species or species habitat may occur within area |
| Dasyurus geoffroii Chuditch, Western Quoll [330] | Vulnerable | Species or species habitat known to occur within area |
| Pseudocheirus occidentalis Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911] | Critically Endangered | Species or species habitat may occur within area |
| Setonix brachyurus Quokka [229] | Vulnerable | Species or species habitat likely to occur within area |
| Other | | |
| Westralunio carteri Carter's Freshwater Mussel, Freshwater Mussel [86266] | Vulnerable | Species or species habitat known to occur within area |
| Plants | | |
| Acacia anomala Grass Wattle, Chittering Grass Wattle [8153] | Vulnerable | Species or species habitat known to occur within area |
| Andersonia gracilis Slender Andersonia [14470] | Endangered | Species or species habitat known to occur within area |
| Anthocercis gracilis Slender Tailflower [11103] | Vulnerable | Species or species habitat known to occur within area |
| Austrostipa bronwenae [87808] | Endangered | Species or species habitat known to occur within area |
| Banksia mimica Summer Honeypot [82765] | Endangered | Species or species habitat likely to occur within area |
| Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309] | Endangered | Species or species habitat likely to occur within area |
| Calytrix breviseta subsp. breviseta Swamp Starflower [23879] | Endangered | Species or species habitat known to occur within area |
| Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [88881] | Endangered | Species or species habitat may occur within area |
| Conospermum undulatum Wavy-leaved Smokebush [24435] | Vulnerable | Species or species habitat likely to occur within area |
| Darwinia apiculata Scarp Darwinia [8763] | Endangered | Species or species habitat known to occur within area |
| Diplolaena andrewsii [6601] | Endangered | Species or species habitat likely to occur within area |

| Name | Status | Type of Presence |
|---|-----------------------|--|
| Diuris drummondii Tall Donkey Orchid [4365] | Vulnerable | Species or species habitat likely to occur within area |
| Diuris micrantha Dwarf Bee-orchid [55082] | Vulnerable | Species or species habitat likely to occur within area |
| Diuris purdiei Purdie's Donkey-orchid [12950] | Endangered | Species or species habitat known to occur within area |
| Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753] | Endangered | Species or species habitat likely to occur within area |
| Drakaea micrantha Dwarf Hammer-orchid [56755] | Vulnerable | Species or species habitat may occur within area |
| Eleocharis keigheryi Keighery's Eleocharis [64893] | Vulnerable | Species or species habitat known to occur within area |
| Eremophila glabra subsp. chlorella [84927] | Endangered | Species or species habitat known to occur within area |
| Eucalyptus x balanites Cadda Road Mallee, Cadda Mallee [87816] | Endangered | Species or species habitat may occur within area |
| Goodenia arthrotricha [12448] | Endangered | Species or species habitat known to occur within area |
| Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909] | Endangered | Species or species habitat likely to occur within area |
| Grevillea thelemanniana Spider Net Grevillea [32835] | Critically Endangered | Species or species habitat known to occur within area |
| Lasiopetalum pterocarpum Wing-fruited Lasiopetalum [64922] | Endangered | Species or species habitat may occur within area |
| Lepidosperma rostratum Beaked Lepidosperma [14152] | Endangered | Species or species habitat known to occur within area |
| Macarthuria keigheryi Keighery's Macarthuria [64930] | Endangered | Species or species habitat likely to occur within area |
| Ptilotus pyramidatus Pyramid Mulla-mulla [18216] | Critically Endangered | Species or species habitat known to occur within area |
| Synaphea sp. Fairbridge Farm (D. Papenfus 696) Selena's Synaphea [82881] | Critically Endangered | Species or species habitat known to occur within area |
| Synaphea sp. Pinjarra Plain (A.S. George 17182) [86878] | Endangered | Species or species habitat may occur within area |
| Thelymitra dedmaniarum Cinnamon Sun Orchid [65105] | Endangered | Species or species habitat likely to occur within area |

| Name | Status | Type of Presence |
|--|-----------------------|--|
| Thelymitra stellata Star Sun-orchid [7060] | Endangered | Species or species habitat known to occur within area |
| Listed Migratory Species | | [Resource Information] |
| * Species is listed under a different scientific name on the EPBC Act - Threatened Species list. | | |
| Name | Threatened | Type of Presence |
| Migratory Marine Birds | | |
| Apus pacificus Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Migratory Terrestrial Species | | |
| Motacilla cinerea Grey Wagtail [642] | | Species or species habitat may occur within area |
| Migratory Wetlands Species | | |
| Actitis hypoleucos Common Sandpiper [59309] | | Species or species habitat may occur within area |
| Calidris acuminata Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| Calidris ferruginea Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calidris melanotos Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus Osprey [952] | | Species or species habitat may occur within area |
| Tringa nebularia Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |

Other Matters Protected by the EPBC Act

| Commonwealth Land | | [Resource Information] |
|---|------------|--|
| The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information. | | |
| Name | | |
| Commonwealth Land - | | |
| Listed Marine Species | | [Resource Information] |
| * Species is listed under a different scientific name on the EPBC Act - Threatened Species list. | | |
| Name | Threatened | Type of Presence |
| Birds | | |
| Actitis hypoleucos Common Sandpiper [59309] | | Species or species habitat may occur within area |
| Apus pacificus Fork-tailed Swift [678] | | Species or species habitat likely to occur |

| Name | Threatened | Type of Presence |
|---|-----------------------|--|
| Ardea alba Great Egret, White Egret [59541] | Critically Endangered | within area |
| Ardea ibis Cattle Egret [59542] | | Breeding known to occur within area |
| Calidris acuminata Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| Calidris ferruginea Curlew Sandpiper [856] | | Species or species habitat may occur within area |
| Calidris melanotos Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster White-bellied Sea-Eagle [943] | Critically Endangered | Species or species habitat likely to occur within area |
| Merops ornatus Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| Motacilla cinerea Grey Wagtail [642] | | Species or species habitat may occur within area |
| Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847] | | Species or species habitat may occur within area |
| Pandion haliaetus Osprey [952] | | Species or species habitat may occur within area |
| Rostratula benghalensis (sensu lato) Painted Snipe [889] | Endangered* | Species or species habitat likely to occur within area |
| Tringa nebularia Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |

Extra Information

| State and Territory Reserves | [Resource Information] |
|------------------------------|--------------------------|
| Name | State |
| Canning River | WA |
| Dundas Road | WA |
| Kenwick Wetlands | WA |
| Korung | WA |
| Lesmurdie Falls | WA |
| Unnamed WA23076 | WA |
| Unnamed WA29815 | WA |
| Unnamed WA37997 | WA |

Regional Forest Agreements

[Resource Information]

Note that all areas with completed RFAs have been included.

| Name | State |
|-----------------------------------|-------------------|
| South West WA RFA | Western Australia |

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

| Name | Status | Type of Presence |
|--|--------|--|
| Birds | | |
| Acridotheres tristis Common Myna, Indian Myna [387] | | Species or species habitat likely to occur within area |
| Anas platyrhynchos Mallard [974] | | Species or species habitat likely to occur within area |
| Carduelis carduelis European Goldfinch [403] | | Species or species habitat likely to occur within area |
| Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803] | | Species or species habitat likely to occur within area |
| Passer domesticus House Sparrow [405] | | Species or species habitat likely to occur within area |
| Passer montanus Eurasian Tree Sparrow [406] | | Species or species habitat likely to occur within area |
| Streptopelia chinensis Spotted Turtle-Dove [780] | | Species or species habitat likely to occur within area |
| Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781] | | Species or species habitat likely to occur within area |
| Sturnus vulgaris Common Starling [389] | | Species or species habitat likely to occur within area |
| Turdus merula Common Blackbird, Eurasian Blackbird [596] | | Species or species habitat likely to occur within area |
| Mammals | | |
| Bos taurus Domestic Cattle [16] | | Species or species habitat likely to occur within area |
| Canis lupus familiaris Domestic Dog [82654] | | Species or species habitat likely to occur within area |
| Capra hircus Goat [2] | | Species or species habitat likely to occur within area |
| Felis catus Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Feral deer Feral deer species in Australia [85733] | | Species or species |

| Name | Status | Type of Presence |
|---|--------|---|
| Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129] | | habitat likely to occur within area Species or species habitat likely to occur within area |
| Mus musculus House Mouse [120] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Rattus norvegicus Brown Rat, Norway Rat [83] | | Species or species habitat likely to occur within area |
| Rattus rattus Black Rat, Ship Rat [84] | | Species or species habitat likely to occur within area |
| Sus scrofa Pig [6] | | Species or species habitat likely to occur within area |
| Vulpes vulpes Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| Plants | | |
| Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643] | | Species or species habitat likely to occur within area |
| Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473] | | Species or species habitat likely to occur within area |
| Brachiaria mutica Para Grass [5879] | | Species or species habitat may occur within area |
| Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera Bitou Bush, Boneseed [18983] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera subsp. monilifera Boneseed [16905] | | Species or species habitat likely to occur within area |
| Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466] | | Species or species habitat likely to occur within area |
| Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800] | | Species or species habitat likely to occur within area |
| Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126] | | Species or species habitat likely to occur within area |
| Genista sp. X Genista monspessulana Broom [67538] | | Species or species habitat may occur within area |
| Lantana camara Lantana, Common Lantana, Kamara Lantana, | | Species or species |

| Name | Status | Type of Presence |
|---|--------|--|
| Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] | | habitat likely to occur within area |
| Lycium ferocissimum | | |
| African Boxthorn, Boxthorn [19235] | | Species or species habitat likely to occur within area |
| Olea europaea | | |
| Olive, Common Olive [9160] | | Species or species habitat may occur within area |
| Pinus radiata | | |
| Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780] | | Species or species habitat may occur within area |
| Rubus fruticosus aggregate | | |
| Blackberry, European Blackberry [68406] | | Species or species habitat likely to occur within area |
| Sagittaria platyphylla | | |
| Delta Arrowhead, Arrowhead, Slender Arrowhead [68483] | | Species or species habitat likely to occur within area |
| Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii | | |
| Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497] | | Species or species habitat likely to occur within area |
| Salvinia molesta | | |
| Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665] | | Species or species habitat likely to occur within area |
| Tamarix aphylla | | |
| Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018] | | Species or species habitat likely to occur within area |

| Reptiles |
|--|
| Hemidactylus frenatus |
| Asian House Gecko [1708] |
| Species or species habitat likely to occur within area |

| Nationally Important Wetlands | [Resource Information] |
|---|--------------------------|
| Name | State |
| Brixton Street Swamps | WA |
| Perth Airport Woodland Swamps | WA |

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-31.992005 115.989848,-31.996664 115.994311,-31.999284 115.997058,-32.003069 115.998431,-32.011512 115.997058,-32.019954 116.001178,-32.028686 116.004954,-32.031597 116.008388

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
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- [-Australian National Herbarium, Canberra](#)
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- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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NatureMap Species Report

Created By Guest user on 22/12/2020

Kingdom Plantae

Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)

Current Names Only Yes

Core Datasets Only Yes

Method 'By Line'

Vertices 31° 59' 13" S, 115° 59' 06" E 31° 59' 44" S, 115° 59' 36" E 31° 59' 58" S, 115° 59' 48" E 32° 00' 08" S, 115° 59' 52" E 32° 00' 22" S, 115° 59' 51" E 32° 00' 32" S, 115° 59' 48" E 32° 00' 42" S, 115° 59' 47" E 32° 00' 57" S, 115° 59' 55" E 32° 01' 17" S, 116° 00' 07" E 32° 01' 31" S, 116° 00' 12" E 32° 01' 41" S, 116° 00' 15" E 32° 01' 54" S, 116° 00' 30" E

| Name ID | Species Name | Naturalised | Conservation Code | ¹ Endemic To Query Area |
|---------|---|-------------|-------------------|------------------------------------|
| 1. | 3219 <i>Acacia anomala</i> (Grass Wattle) | | T | |
| 2. | 3220 <i>Acacia aphylla</i> (Leafless Rock Wattle) | | T | |
| 3. | 3373 <i>Acacia horridula</i> | | P3 | |
| 4. | 14932 <i>Acacia lasiocarpa</i> var. <i>bracteolata</i> long peduncle variant (G.J. Keighery 5026) | | P1 | |
| 5. | 14131 <i>Acacia oncinophylla</i> subsp. <i>patulifolia</i> | | P4 | |
| 6. | 1729 <i>Allocasuarina grevilleoides</i> | | P3 | |
| 7. | 6309 <i>Andersonia gracilis</i> | | T | |
| 8. | 41732 <i>Andersonia</i> sp. <i>Blepharifolia</i> (F. & J. Hort 1919) | | P2 | |
| 9. | 6946 <i>Anthocercis gracilis</i> (Slender Tailflower) | | T | |
| 10. | 141 <i>Aponogeton hexatepalus</i> (Stalked Water Ribbons) | | P4 | |
| 11. | 7849 <i>Asteridea gracilis</i> | | P3 | |
| 12. | 38480 <i>Austrostipa bronwenae</i> | | T | |
| 13. | 45402 <i>Babingtonia urbana</i> (Coastal Plain Babingtonia) | | P3 | |
| 14. | 32211 <i>Banksia mimica</i> (Summer Honeypot) | | T | |
| 15. | 32138 <i>Banksia pteridifolia</i> subsp. <i>vernalis</i> | | P3 | |
| 16. | 5390 <i>Beaufortia purpurea</i> (Purple Beaufortia) | | P3 | |
| 17. | 48689 <i>Bolboschoenus fluviatilis</i> | | P1 | |
| 18. | 4444 <i>Boronia tenuis</i> (Blue Boronia) | | P4 | |
| 19. | 3178 <i>Byblis gigantea</i> (Rainbow Plant) | | P3 | |
| 20. | 1596 <i>Caladenia huegelii</i> (Grand Spider Orchid) | | T | |
| 21. | 20096 <i>Calandrinia</i> sp. <i>Piawaning</i> (A.C. Beauglehole 12257) | | P1 | |
| 22. | 1213 <i>Calectasia cyanea</i> (Blue Tinsel Lily) | | T | |
| 23. | 5396 <i>Calothamnus accedens</i> | | P4 | |
| 24. | 13653 <i>Calytrix breviseta</i> subsp. <i>breviseta</i> | | T | |
| 25. | 759 <i>Carex tereticaulis</i> | | P3 | |
| 26. | 19338 <i>Chamaescilla gibsonii</i> | | P3 | |
| 27. | 14663 <i>Comesperma griffinii</i> | | P2 | |
| 28. | 4560 <i>Comesperma rhadinocarpum</i> (Slender-fruited Comesperma) | | P3 | |
| 29. | 13999 <i>Conospermum undulatum</i> | | T | |
| 30. | 5505 <i>Darwinia apiculata</i> (Scarp Darwinia) | | T | |
| 31. | 1637 <i>Diuris purdiei</i> (Purdie's Donkey Orchid) | | T | |
| 32. | 3115 <i>Drosera occidentalis</i> (Western Sundew) | | P4 | |
| 33. | 17605 <i>Eleocharis keigheryi</i> | | T | |
| 34. | 17150 <i>Eremophila glabra</i> subsp. <i>chlorella</i> | | T | |
| 35. | 41801 <i>Eryngium pinnatifidum</i> subsp. <i>Palustre</i> (G.J. Keighery 13459) | | P3 | |
| 36. | 41810 <i>Eryngium</i> sp. <i>Subdecumbens</i> (G.J. Keighery 5390) | | P3 | |
| 37. | 7491 <i>Goodenia arthrotricha</i> | | T | |
| 38. | 2107 <i>Grevillea thelemanniana</i> (Spider Net Grevillea) | | T | |
| 39. | 1469 <i>Haemodorum loratum</i> | | P3 | |
| 40. | 6686 <i>Halgania corymbosa</i> | | P3 | |
| 41. | 5146 <i>Hibbertia montana</i> | | P4 | |
| 42. | 6233 <i>Hydrocotyle lemnoides</i> (Aquatic Pennywort) | | P4 | |
| 43. | 29775 <i>Isopogon drummondii</i> | | P3 | |
| 44. | 16317 <i>Isotropis cuneifolia</i> subsp. <i>glabra</i> | | P3 | |
| 45. | 20462 <i>Jacksonia gracillima</i> | | P3 | |
| 46. | 5025 <i>Lasiopetalum bracteatum</i> (Helena Velvet Bush) | | P4 | |
| 47. | 45081 <i>Lasiopetalum glutinosum</i> subsp. <i>glutinosum</i> | | P3 | |
| 48. | 942 <i>Lepidosperma rostratum</i> | | T | |

| | Name ID | Species Name | Naturalised | Conservation Code | ¹ Endemic To Query Area |
|-----|---------|---|-------------|-------------------|------------------------------------|
| 49. | 19241 | <i>Lepyrodia curvescens</i> | | P2 | |
| 50. | 17106 | <i>Macarthuria keigheryi</i> | | T | |
| 51. | 33638 | <i>Meionectes tenuifolia</i> | | P3 | |
| 52. | 37683 | <i>Melaleuca viminalis</i> | | P2 | |
| 53. | 6193 | <i>Myriophyllum echinatum</i> | | P3 | |
| 54. | 36200 | <i>Ornduffia submersa</i> | | P4 | |
| 55. | 5260 | <i>Pimelea rara</i> (Summer Pimelea) | | P4 | |
| 56. | 8163 | <i>Pithocarpa corymbulosa</i> (Corymbose Pithocarpa) | | P3 | |
| 57. | 11132 | <i>Platysace ramosissima</i> | | P3 | |
| 58. | 2753 | <i>Ptilotus pyramidatus</i> | | T | Y |
| 59. | 974 | <i>Schoenus benthamii</i> | | P3 | |
| 60. | 980 | <i>Schoenus capillifolius</i> | | P3 | |
| 61. | 999 | <i>Schoenus loliaceus</i> | | P2 | |
| 62. | 1003 | <i>Schoenus natans</i> (Floating Bog-rush) | | P4 | |
| 63. | 1008 | <i>Schoenus pennisetis</i> | | P3 | |
| 64. | 16280 | <i>Schoenus</i> sp. Beaufort (G.J. Keighery 6291) | | P1 | |
| 65. | 17731 | <i>Schoenus</i> sp. Waroona (G.J. Keighery 12235) | | P3 | |
| 66. | 8212 | <i>Senecio leucoglossus</i> | | P4 | |
| 67. | 18564 | <i>Stylidium aceratum</i> | | P3 | |
| 68. | 7756 | <i>Stylidium longitubum</i> (Jumping Jacks) | | P4 | |
| 69. | 7771 | <i>Stylidium periscelanthum</i> (Pantaloons Triggerplant) | | P3 | |
| 70. | 7803 | <i>Stylidium striatum</i> (Fan-leaved Triggerplant) | | P4 | |
| 71. | 48297 | <i>Styphelia filifolia</i> | | P3 | |
| 72. | 18590 | <i>Synaphea</i> sp. Fairbridge Farm (D. Papenfus 696) | | T | |
| 73. | 1033 | <i>Tetraria australiensis</i> | | T | |
| 74. | 20729 | <i>Thelymitra magnifica</i> (Crystal Brook Star Orchid) | | P1 | |
| 75. | 10862 | <i>Thelymitra stellata</i> (Star Orchid) | | T | |
| 76. | 1317 | <i>Thysanotus anceps</i> | | P3 | |
| 77. | 14714 | <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i> | | P4 | |

Conservation Codes

T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

Appendix D – Black cockatoo rank categories

Black-Cockatoo Nesting Tree rank categories (developed by Bamford Consulting Ecologists and taken from Woodman 2020)

| Rank | Description |
|------|---|
| 1 | Active nest observed; adult (or immature) bird seen entering or emerging from hollow. The rank of 1 is retained if a hollow is known to have been used within the previous three years. |
| 2 | Hollow of suitable size and angle (i.e. near-vertical) visible with chew marks around entrance. While it cannot with certainty be assumed that such chew marks were made by a Black-Cockatoo, they indicate activity of a parrot at a hollow potentially suitable for use by Black-Cockatoos. |
| 3 | Potentially suitable hollow visible but no chew marks present; or potentially suitable hollow present (as suggested by structure of tree, such as large, vertical trunk broken off at a height of > 10 m). |
| 4 | Tree with large hollows or broken branches that might contain large hollows but hollows or potential hollows are not vertical or near-vertical; thus a tree with or likely to have hollows of sufficient size but not to have hollows of the angle preferred by Black-Cockatoos. |
| 5 | Tree lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown. |
| 0 | Dead or stunted tree meeting the DBH requirement but with no potential to form a suitable hollow at a suitable height |

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14/[https://projectsportal.ghd.com/sites/pp18_01/thcroetokelvintarget/ProjectDocs/12535007-REP_Targeted flora survey and black cockatoo assessment.docx](https://projectsportal.ghd.com/sites/pp18_01/thcroetokelvintarget/ProjectDocs/12535007-REP_Targeted%20flora%20survey%20and%20black%20cockatoo%20assessment.docx)

Document Status

| Revision | Author | Reviewer | | Approved for Issue | | |
|----------|------------------------------|----------|---|--------------------|---|-----------|
| | | Name | Signature | Name | Signature | Date |
| 0 | S Flemmington G Gaikhorst | D Farrar | | D Farrar | | 1/2/2021 |
| 1 | J Collins | D Farrar |  | D Farrar |  | 10/2/2021 |
| | | | | | | |

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