



mainroads
WESTERN AUSTRALIA

Assessment Report and Vegetation Management Plan

*We're working for
Western Australia.*

Great Eastern Highway Upgrade
Between SLK 327 & 339.8

October 2020

EOS 2058

D20#560677

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1 SUMMARY

1.1 Project Information

Project Name: Great Eastern Highway Upgrade SLK 327 to 339.8.

Project Location(s): The project is located on Great Eastern Highway (GEH) (H005), between Straight Line Kilometre (SLK) 327 to 339.8, between the town sites of Bodallin and Moorine Rock, in the Shire of Yilgarn.

Project Purpose / Components: The age and wear along this section of GEH is causing significant safety issues for road users. The purpose of the project is to widen and upgrade the surface for GEH, including associated drainage upgrades, intersection upgrades and upgrades to crossovers.

Area Proposed to be Cleared: 8.48 ha.

Temporary Clearing Required: 0 ha.

A detailed assessment of the project clearing activities was undertaken and an Assessment Report (AR) produced. The AR outlines the key activities associated with the project, the existing environment and an assessment of native vegetation clearing. This assessment provides an evaluation of the vegetation clearing impacts associated with the project using the ten clearing principles and strategies to be used to manage vegetation clearing. Key items associated with the clearing impact assessment are listed below.

- The project will require the clearing of up to 8.48 ha of native vegetation;
- The clearing is at variance to principles (e) and (f), not likely to be at variance to principles (a), (b), (c), (g), (i) and (j), and not at variance to principles (d), and (h).
- The clearing does not comprise of any Threatened or Priority flora species;
- The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed Eucalypt Woodlands of the Western Australian Wheatbelt Threatened Ecological Community (TEC) and state equivalent Priority Ecological Community (PEC) occurs adjacent to the proposal area. Less than 0.01 ha of this community will be cleared;
- The clearing does not comprise of any significant habitat for fauna;
- The clearing area occurs in an extensively cleared landscape and comprises an underrepresented vegetation association. Potential impacts on remnant vegetation because of the clearing will be managed by the implementation of an offset.

Main Roads Statewide Purpose Clearing Permit CPS 818 will be used to undertake native vegetation clearing for the project. Project clearing will be undertaken in accordance with the conditions of CPS 818 and detailed records of native vegetation clearing will be maintained as required under the permit.

2 ASSESSMENT SCOPE

This clearing impact assessment involved a desktop analysis of environmental aspects and impacts, a site investigation, and an assessment of native vegetation clearing impacts. The study area is confined to a local area of a 15 km radius. This assessment determined the need to develop and obtain approvals from the Department of Water and Environmental Regulation (DWER) for an Assessment Report, Vegetation Management Plan and Offset Proposal.

These terms are used in the Assessment Report:

- *Clearing area*: This area represents the area of native vegetation clearing for the project, comprising the designed earthworks and a buffer to allow for the movement of machinery during construction.
- *Proposal area*: the maximum area within which the clearing area will be located. This envelope is slightly larger than the clearing area to allow for minor changes to the project footprint as the design process continues, and account for unexpected changes to the design that can occur during construction. The Assessment Report presents the environmental values of the project area, while the level of impact is calculated based on the clearing area.

3 PROPOSAL DESCRIPTION

Table 1 describes the proposal in detail, including the full extent of the proposed work and all the components of the proposal.

Table 1. Proposal Description

Project Components	Clearing Required (Y/N)	Estimated Clearing Area (ha)
Road Widening SLK 327 – 339.8	<input checked="" type="checkbox"/>	8.48
Materials Pits	<input type="checkbox"/>	
Fencing	<input type="checkbox"/>	
Service relocation	<input checked="" type="checkbox"/>	Included in road widening clearing area
Drainage infrastructure improvements	<input checked="" type="checkbox"/>	Included in road widening clearing area
Site office and laydown/storage	<input type="checkbox"/>	

3.1 Proposal Location

The proposal area is located on GEH, between SLK 327 and 339.8, in the Shire of Yilgarn. Figures 1 and 2 below show the regional location and boundaries of the study area (15 km radius). Figure 3 shows the boundary of the proposal area.

MGA reference: Start 685474.77 E, 6530939.46 N
 Finish 697669.95 E, 6533762.78 N

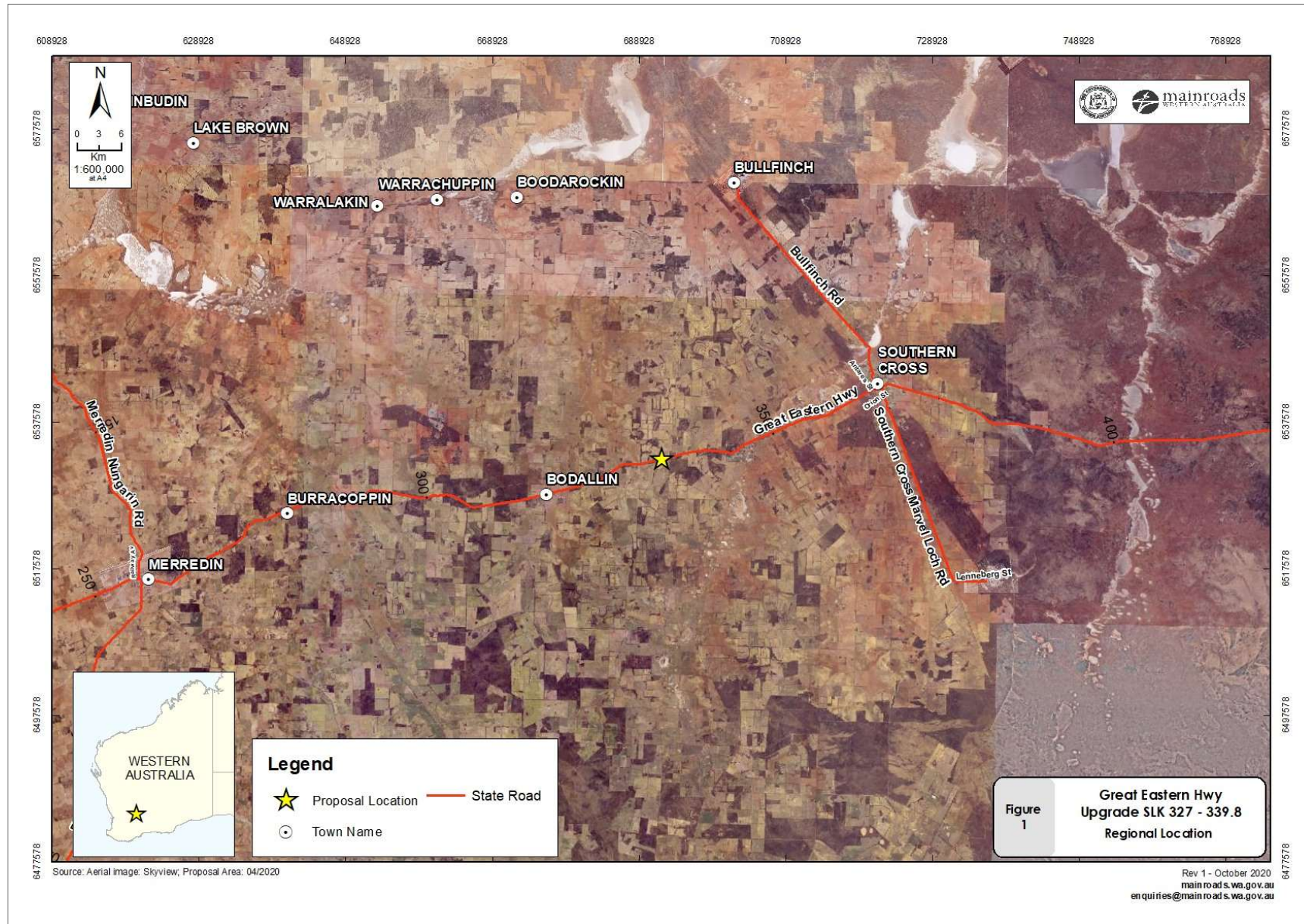


Figure 1 – Regional Location

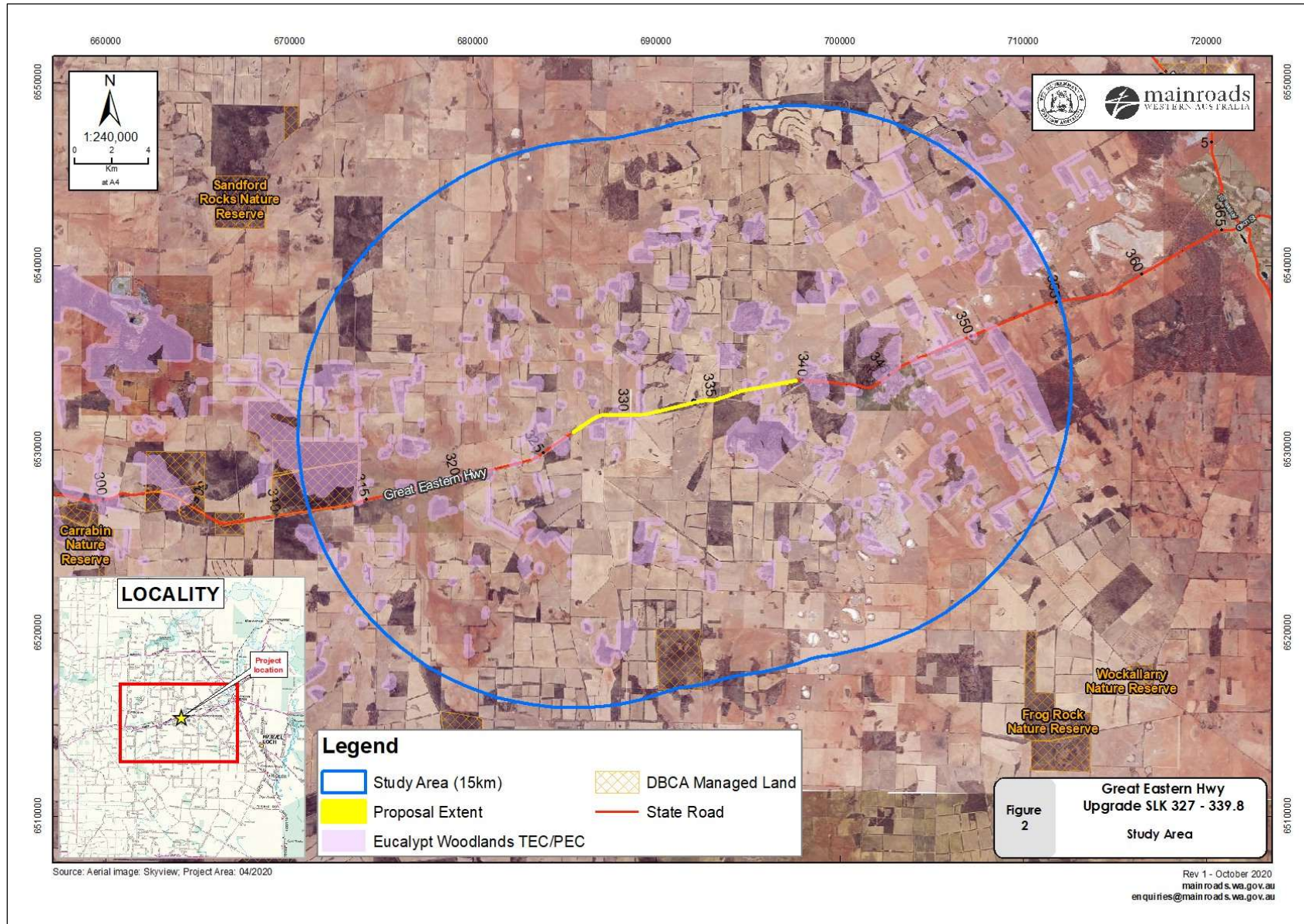


Figure 2 – Study Area

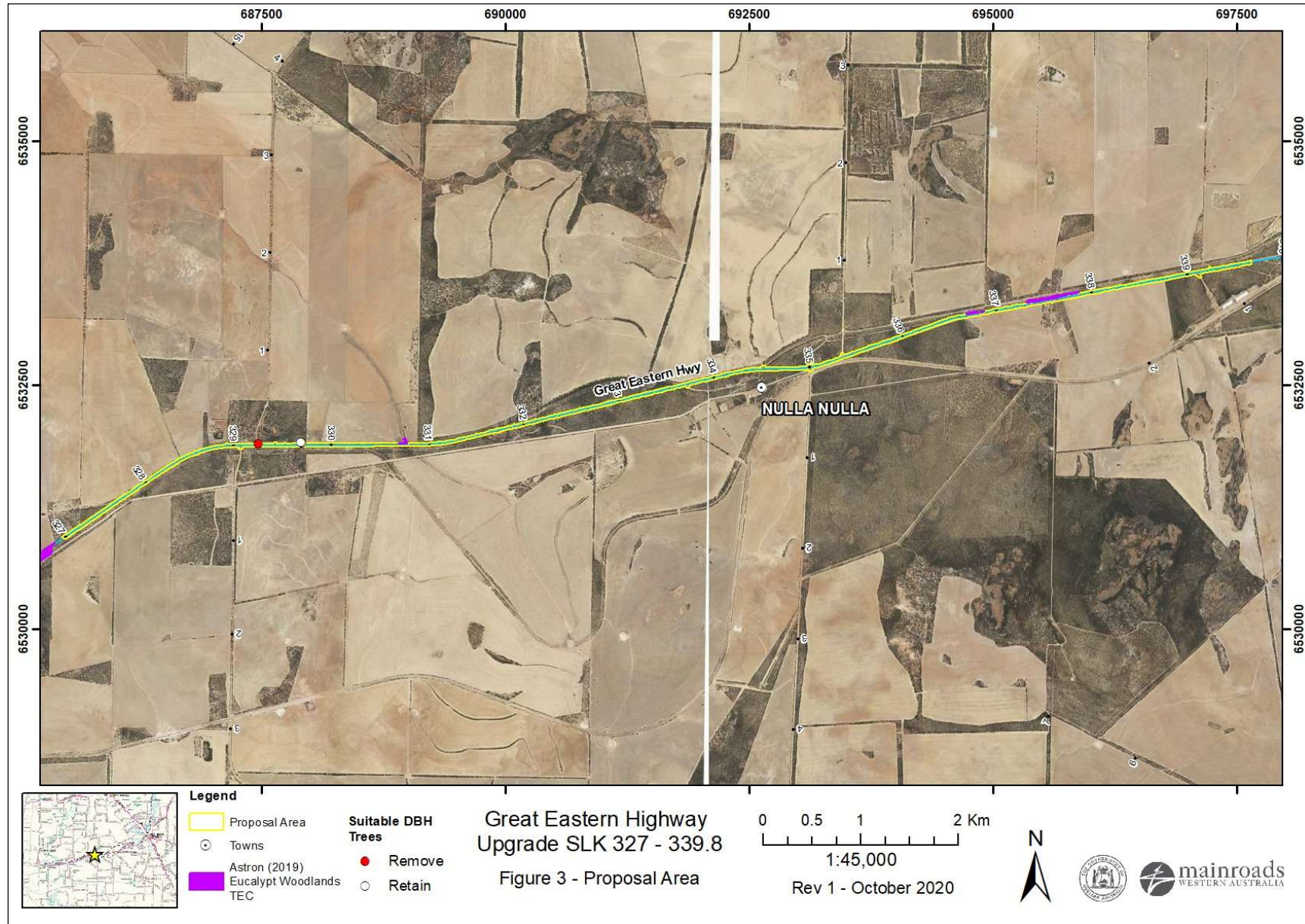


Figure 3 – Proposal Area

4 Methodology

4.1 Assessment Report

A preliminary desktop study was undertaken to assess the proposed native vegetation clearing and potential constraints associated with the project. The desktop assessment included viewing GIS shapefiles, reviewing government agency managed databases (where necessary) and consulting with relevant stakeholders. The outcome of the desktop study identified that native vegetation clearing was likely to be at variance with one or more of the ten clearing principles.

The methodology used when completing an assessment of the clearing principles is provided in Section 5.3.

Further environmental assessment of the impacts of native vegetation clearing was undertaken including site visits to verify desktop information and various biological surveys to delineate key environmental elements of the proposal area. These surveys include:

- GHD (2016) Great Eastern Highway – Merredin to Southern Cross SLK 258.5 - 365.5 – Biological Survey – February 2016 (Attachment 1);
- Astron (2018) Great Eastern Highway – Merredin to Southern Cross SLK 258.5 - 365.5 – Biological Survey – September 2018 (Attachment 2);
- Ecologia (2019a) Great Eastern Highway 327 – 365.8 SLK Desktop Assessment (Attachment 3);
- Ecologia (2019b) Great Eastern Highway - Walgoolan to Southern Cross Package 6 to 8: SLK 327 to 365.8 – Targeted Flora Survey (Attachment 4);

A summary of the outcomes of the surveys are provided in Section 6. The methodology used for the surveys are provided for in the appended survey reports.

5 Clearing of Native Vegetation

Native vegetation describes all indigenous aquatic and terrestrial vegetation (living or dead). The term does not include vegetation that was intentionally sown, planted or propagated unless it was required under a statutory condition.

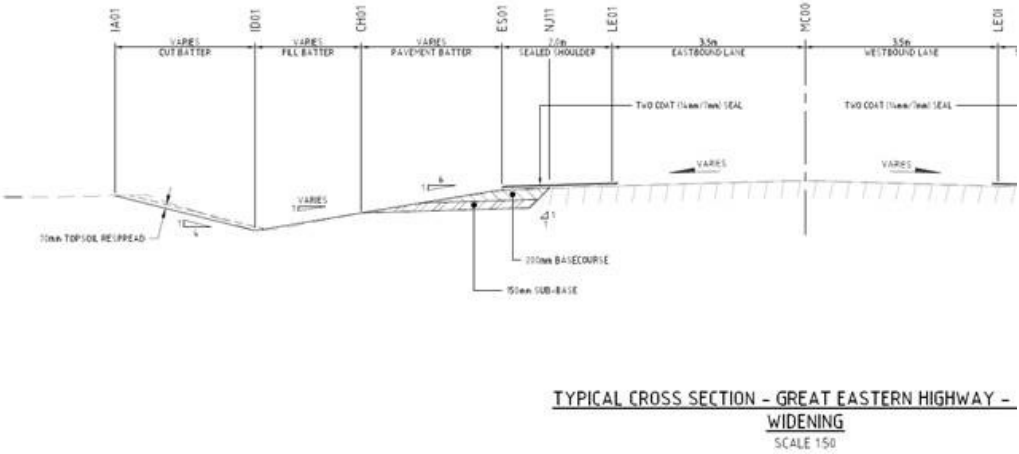
Apart from activities that are exempt under the clearing regulation (Section 5 – Prescribed Clearing), all native vegetation clearing completed by Main Roads will be undertaken using a permit.

5.1 Measures to Avoid, Minimise, Mitigate and Manage Project Clearing Impacts

The area of vegetation clearing was considered during proposal development, and clearing has been avoided where possible. Various alternatives to clearing were also considered, where those alternatives did not compromise the safety objectives of the proposal. Due to the age and wear of this section of GEH, very narrow seal widths and poor geometry, there were few alternatives to widening and resealing GEH.

The design and management measures implemented to avoid and minimise the project clearing impacts are provided in Table 2.

Table 2. Justification of Avoiding, Minimising, Mitigating and Managing Clearing Impacts

Design or Management Measure	Applied to Current Design	Discussion and Justification
<p>Steepen batter slopes</p>	<p>No</p>	<p>Due to the traffic volumes, vehicle type and posted speeds these batters cannot be changed significantly. Further, the existing terrain correlates to the potential batter slope without changing the existing shape of batter. See below.</p>  <p style="text-align: center;">TYPICAL CROSS SECTION - GREAT EASTERN HIGHWAY - WIDENING SCALE 1:50</p>
<p>Installation of safety barriers</p>	<p>No</p>	<p>Within this project area, the installation of safety barriers would not reduce the clearing footprint due to the requirements of roadside drainage. Refer to above cross section showing the horizontal footprint.</p>
<p>Alignment to one side of existing road</p>	<p>Yes</p>	<p>The upgrade of GEH has been aligned to mostly impact on the north of the existing road, thereby keeping most of the impact on this side, and maintaining the south side at its existing grade in efforts to mitigate vegetation clearing. See cross section below.</p>

Design or Management Measure	Applied to Current Design	Discussion and Justification
<p>Alternative alignment to follow existing road (or) to preferentially locate within pasture or a degraded areas</p>	<p>No</p>	<p>Scope of works is to upgrade GEH along its existing alignment. Realignment not applicable to this project.</p>
<p>Installation of kerbing</p>	<p>No</p>	<p>Kerbing does not apply for this section of road, as it becomes a hazard to road users due to existing level differences.</p>
<p>Simplification of design to reduce number of lanes and/or complexity of intersections</p>	<p>Yes</p>	<p>The upgrade of this section of GEH will utilise the existing cleared zone as far as practicable, with only minor clearing required to widen GEH to the full design extent.</p>

Design or Management Measure	Applied to Current Design	Discussion and Justification
Preferential use of existing cleared areas for access tracks, construction storage and stockpiling	No	Existing cleared areas have been considered for access over vegetated areas. All ancillary activities, such as site offices, laydown areas, storage areas, materials extraction and new fencing will be restricted to existing cleared areas, such as utilising cleared farmland close to the project.
Drainage modification	Yes	Drainage has been considered and mostly not changed on the south side of the road to minimise project footprint.

5.2 Vegetation Details

5.2.1 Project Site Vegetation Description

The project is located towards the eastern Wheatbelt region. The proposal area is surrounded by a mix of cleared agricultural land and patches of remnant native vegetation.

A biological survey conducted along GEH mapped six native vegetation associations within the proposal area (GHD, 2016), being:

- *Acacia* spp. and *Melaleuca* spp. tall open shrubland;
- *Allocasuarina* tall shrubland;
- *Eucalyptus capillosa* subsp. *capillosa* open forest;
- *Eucalyptus loxophleba* subsp. *lissophloia* open mallee forest;
- *Eucalyptus* spp. mallee woodland; and
- Scattered natives

Allocasuarina tall shrubland, *Acacia* spp. and *Melaleuca* spp. tall open shrubland and Scattered natives were the most common vegetation associations recorded, combining to form over 95% of the proposal area.

The vegetation condition of the proposal area ranges from excellent to completely degraded. The following vegetation conditions apply to the proposal area, shown in Table 3.

Table 3 – Vegetation condition of the proposal area

Condition (EPA, 2016)	Area (ha)	Area (%)
Excellent	7.60	17.9 %
Excellent to Very Good	1.5	3.3 %
Very Good	0.58	1.3 %
Good	0.95	2.1 %
Good to Degraded	0.65	1.5 %
Degraded	2.07	4.6 %
Degraded to Completely Degraded	0.23	0.5 %
Completely Degraded	1.35	3.0 %
Cleared	30.01	66.8%

The vegetation to be cleared occurs along an existing transport corridor. This section of GEH was marginally widened in 2007, which involved clearing. The further widening of GEH by this proposal will require the clearing of narrow, linear areas of remnant native vegetation, averaging approximately three metres of clearing either side of GEH. Areas of native vegetation regrowth in the project area that were previously cleared will be cleared under appropriate exemptions.

For a full description of the existing vegetation, refer to GHD (2016).

Tables 4 and 5 provide details of the Pre-European Vegetation Associations within the proposal area and the remaining extents of these associations.

Table 4. Summary of Proposal Area’s Mapped Pre-European Vegetation Associations

Pre-European Vegetation Association(s)	Clearing Description	Vegetation Condition	Comments
<p>Vegetation Association 8 described as Medium woodland; salmon gum & gimlet;</p> <p>Vegetation Association 1413 Shrublands; acacia, casuarina & melaleuca thicket</p> <p>(Government of Western Australia, 2019).</p>	<p>Clearing up to 8.48 ha for the purpose of approximately 13 km of road upgrades, including road widening, drainage infrastructure improvements and crossover upgrades.</p>	<p>Excellent to Completely Degraded (EPA, 2016).</p>	<p>Vegetation description and condition determined from biological survey (GHD, 2016).</p>

Table 5. Pre-European Vegetation Representation (Government of Western Australia, 2019)

Pre-European Vegetation Association	Scale	Pre-European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Veg Assoc No. 8	Statewide	694,638.14	346,425.77	50%	7%
	IBRA Bioregion Avon Wheatbelt	356,571.81	50,640.31	14%	1%
	IBRA Sub-region Merredin	353,871.79	49,941.57	14%	1%
	Local Government Authority Shire of Yilgarn	163,920.73	59,992.64	37%	7%
Veg Assoc No. 1413	Statewide	1,679,916.32	1,286,855.48	77%	13%
	IBRA Bioregion Avon Wheatbelt	546,675.55	174,102.84	32%	2%
	IBRA Sub-region Merredin	546,675.55	174,102.84	32%	2%
	Local Government Authority Shire of Yilgarn	538,791.10	395,458.48	37%	19%

5.3 Assessment against the Ten Clearing Principles

In assessing whether the proposed clearing is likely to have a significant impact on the environment, the proposal was assessed against the ten clearing principles (EP Act 1986, Schedule 5).

Each principle has been assessed in accordance with DWER’s ‘A Guide to the Assessment of Applications to Clear Native Vegetation’.

The assessment has determined that the proposed clearing is at variance to principles (e) and (f), not likely to be at variance to principles (a), (b), (c), (g), (i), and (j), and not at variance to principles (d), and (h).

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Comments	Proposed clearing is not likely to be at variance to this Principle
	<p>The proposal will require the clearing of up to 8.48 ha of native vegetation within an area of 45.73 ha. The proposal area comprises six vegetation types, which are generally described as a mix of <i>Allocasuarina</i> tall shrublands, <i>Acacia</i> spp. and <i>Melaleuca</i> spp. tall open shrublands and various Eucalypt woodlands and forests. The vegetation types within the proposal area are considered typical of those occurring in the local area (GHD, 2016).</p> <p>Vegetation of the proposal area and surrounds varies from excellent to completely degraded in condition (GHD, 2016). Approximately 67% of the proposal area is cleared for infrastructure or is otherwise highly disturbed, with the remaining area of native vegetation predominantly in excellent condition (17%).</p> <p>The project area occurs within the mapped distribution of the Eucalypt Woodlands of the Western Australian Wheatbelt EPBC Act-listed TEC and equivalent state-listed PEC (Priority 3) (GIS Database). A Eucalypt Woodlands TEC/PEC assessment undertaken along GEH mapped three patches along this section of GEH, totalling approximately 1.44 ha of representative vegetation (Astron, 2018).</p> <p>The proposal area has been modified to exclude as much of this community as possible. Following these changes, approximately 0.14 ha of mapped Eucalypt Woodlands TEC/PEC intersects with the proposal area. It is worth noting that this area is an over-estimation of the true extent of this community in the proposal area, as GHD (2016) vegetation condition mapping, aerial imagery and ground level imagery indicate this area includes cleared or highly disturbed areas where no native vegetation clearing will occur. Taking into account ground-truthing undertaken by Main Roads, less than 0.01 ha of low quality Eucalypt Woodlands TEC occurs within the proposal area. Appendix A demonstrates where clearing of Eucalypt Woodlands TEC will occur, or has been avoided.</p> <p>According to available databases, 332 native flora taxa have been previously recorded within 15 kilometres of the project area (DBCA, 2020), which includes the following conservation significant species:</p> <ul style="list-style-type: none"> • <i>Eucalyptus crucis</i> subsp. <i>crucis</i> (En under BC Act, Vu under EPBC Act); • <i>Glossostigma trichodes</i> (P1); • <i>Acacia crenulata</i> (P3); • <i>Acacia filifolia</i> (P3); • <i>Angianthus micropodioides</i> (P3); • <i>Banksia horrida</i> (P3); • <i>Hibbertia glabriuscula</i> (P3);

	<ul style="list-style-type: none"> • <i>Lepidosperma</i> sp. Pigeon Rocks (H. Pringle 30237) (P3); • <i>Rinzia triplex</i> (P3); • <i>Verticordia mitodes</i> (P3); • <i>Myriophyllum petraeum</i> (P4). <p>A desktop assessment and targeted conservation significant flora survey was undertaken to determine the presence of species that were either likely or possible to occur within the proposal area, based on the habitat types recorded by GHD (Ecologia, 2019a; 2019b). The survey did not record any conservation significant flora species within the proposal area (Ecologia, 2019b).</p> <p>One hundred and twenty-two native fauna taxa have been previously recorded within the study area, comprising 76 birds, 21 invertebrates 14 reptiles, 6 amphibian and three mammal species (DBCA, 2020). A level 1 fauna assessment undertaken along GEH between Merredin and Southern Cross recorded 67 native fauna species, consisting of 60 birds, three mammals, three amphibians and one reptile (GHD, 2016). The proposal area contains fewer habitat types than the area surveyed and the vegetation to be cleared occurs directly adjacent to a major road. Therefore, the proposal area is not likely to support a high level of fauna diversity.</p> <p>There are historical records of <i>Leipoa ocellata</i> (Malleefowl) opportunistic sightings within the proposal area (GIS Database). The fauna survey did not record any evidence of this species occurring in the proposal area (GHD, 2016). No other conservation significant fauna species have been recorded within the proposal area (DBCA, 2020; GHD, 2016; GIS Database).</p> <p>Based on the above, the project area is not considered to contain a relatively high level of biodiversity. The proposed clearing is not likely to be at variance to this principle.</p>
Methodology	<p>Astron (2018) DBCA (2020) Ecologia (2019a) Ecologia (2019b) GHD (2016) GIS Database: - DBCA threatened / priority fauna shapefiles</p>

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.

Comments	Proposed clearing is not likely to be at variance to this Principle
	<p>A level 1 fauna assessment was conducted between Merredin and Southern Cross, which includes the proposal area (GHD, 2016). Four habitat types were identified within the proposal area, being <i>Allocasuarina</i> tall shrublands (70%), Mixed shrublands (24%), and Eucalypt woodlands (6%).</p> <p>Malleefowl (<i>Leipoa ocellata</i>), listed as Vulnerable under the <i>Biodiversity Conservation Act 2016</i> (BC Act) and EPBC Act, is known to occur in the local area, including three historical opportunistic sightings within the proposal area (DBCA, 2020; GIS Database). Suitable habitat for this species occurs within the proposal area and surrounds in the form of Eucalypt woodlands and <i>Allocasuarina</i> shrublands (GHD, 2016). No individuals or breeding</p>

activity was observed in the proposal area at the time of the survey (GHD, 2016), and subsequent inspections by Main Roads have not found any recent breeding activity.

The species may utilise the proposal area when dispersing between larger remnants of native vegetation, however taking into consideration this section of GEH retains a wide corridor of native vegetation, the proposed clearing is not likely to significantly reduce the extent of available habitat for this species.

The State-listed Priority 3 species *Parartemia contracta* (a brine shrimp) has been recorded in the study area (DBCA, 2020). There is no habitat for this freshwater species within the proposal area.

A desktop search has identified five additional Threatened fauna species that may occur in the proposal area, being Curlew Sandpiper (*Calidris ferruginea*), Carnaby's Cockatoo (*Calyptorhynchus latirostris*), Night Parrot (*Pezoporus occidentalis*), Chuditch (*Dasyurus geoffroi*) and Shield-backed Trapdoor Spider (*Idiosoma nigrum*) (DAWE, 2020a).

Curlew Sandpiper can occur inland around ephemeral and permanent waterbodies (DAWE, 2020b). There is no suitable habitat for this species in the proposal area.

Although the habitat requirements of the Night Parrot are poorly understood, based on accepted evidence, the proposal area does not contain suitable habitat for this species (GHD, 2016).

In relation to Carnaby's Cockatoo habitat, the proposal area contains one tree with a suitable diameter at breast height (DBH) with no suitable hollows for breeding. Although the proposal area falls at the eastern edge of the mapped distribution of Carnaby's Cockatoo (DAWE, 2020d), Carnaby's Cockatoo is considered to have a very low likelihood of occurrence in the local area, based on the lack of historical records in the surrounding area (GIS Database). The nearest historical record is over 60 km west of the project area (GIS Database), and the nearest confirmed breeding record is over 100 km west of the proposal area (pers. comm WA Museum, 2020). The fauna survey did not sight any birds, or record any evidence of breeding, roosting or foraging in the proposal area, or anywhere else along GEH between Merredin and Southern Cross (GHD, 2016).

Taking into consideration the absence of Carnaby's Cockatoo activity in the local area, the loss of one suitable DBH tree, which does not contain any suitable hollows, is not likely to affect this species.

While the project area may contain suitable foraging species for Carnaby's Cockatoo, it is not considered to form a significant habitat for the species.

Chuditch can occur in the Goldfields and Wheatbelt, albeit in lower densities (Department of Environment and Conservation, 2012). There was no evidence of this species within the proposal area at the time of the survey (GHD, 2016). Chuditch may utilise the habitat types present within the proposal area, however the proposed clearing will not significantly reduce the area of suitable habitat available in the area.

In the Wheatbelt, habitat critical for Shield-backed Trapdoor Spider is identified as open York gum (*Eucalyptus loxophleba*), Salmon gum (*E. salmonophloia*) and Wheatbelt Wandoo (*E. capillosa*) woodland, where Jam (*Acacia acuminata*) forms a sparse understorey in heavy clay soils (DAWE, 2020c). The Eucalypt woodlands habitat type may be suitable for this species; however, this habitat type only forms a small proportion of the clearing (0.62 ha),

	<p>and there are suitable areas of habitat for this species outside of the proposal area (GHD, 2016).</p> <p>While the proposal area may provide some habitat value for fauna, including for conservation significant species, given the clearing will result in the removal of narrow, linear areas of vegetation from directly adjacent to the road, vegetation within the project area is not likely to form significant habitat for fauna.</p> <p>Based on the above, the proposed clearing is not likely to be at variance to this principle.</p>
Methodology	<p>DAWE (2020a) DAWE (2020b) DAWE (2020c) DBCA (2020) Department of Environment and Conservation (2012) Department of the Environment (2020) EPA (2019) GHD (2016) GIS Database: - DBCA threatened / priority fauna shapefiles</p>

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.

Comments	Proposal is not likely to be at variance to this Principle
	<p>According to available databases, one Threatened flora species is known to occur within 15 km of the project area, being <i>Eucalyptus crucis</i> subsp. <i>crucis</i> (DBCA, 2020; GIS Database). This species is found in association with granite outcrops (Western Australian Herbarium, 1998–). There is no suitable habitat for this species in the proposal area (Ecologia, 2019a).</p> <p>A database search has identified 10 Threatened flora species that have the potential to occur in the local area (DAWE, 2020a). The proposal area contains suitable habitat for two of these species, being <i>Eremophila resinosa</i> and <i>Eremophila viscida</i>. Neither of these species have been recorded in the proposal area (Ecologia, 2019b; GHD, 2016).</p> <p>No other Threatened flora species have been recorded in the proposal area (Ecologia, 2019b; GHD, 2016).</p> <p>Based on the above, the proposed clearing is not likely to be at variance to this principle.</p>
Methodology	<p>DBCA (2020) DAWE (2020a) Ecologia (2019a) Ecologia (2019b) GHD (2016) GIS Database: - DBCA threatened / priority flora shapefiles</p>

(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community.

Comments	Proposed clearing is not at variance to this Principle
	<p>According to available databases, no TECs listed under the BC Act are known to occur within the proposal area. None of the vegetation types recorded in the proposal area represent a state listed TEC (GHD, 2016).</p> <p>Based on the above, the proposed clearing is not at variance to this Principle.</p>
Methodology	<p>GHD (2016) GIS Database: - DBCA Shapefiles</p>

(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.

Comments	Proposed clearing is at variance to this Principle																											
	<p>The project occurs in the Avon Wheatbelt IBRA bioregion, of which approximately 19% of pre-European vegetation extent remains (Government of Western Australia, 2019). There is approximately 15% of native vegetation remaining in the study area (GIS Database).</p> <p>The vegetation of the proposal area has been broadly mapped as the following pre-European vegetation associations:</p> <p style="margin-left: 40px;">8: Medium woodland; salmon gum & gimlet 1413: Shrublands; acacia, casuarina & melaleuca thicket</p> <p>The National Objectives and Targets for Biodiversity Conservation recognise that the retention of 30 per cent or more of the pre-clearing extent of each ecological community is necessary if Australia’s biological diversity is to be protected (Commonwealth of Australia, 2001). With regard to the two broad vegetation associations mapped within the proposal area, vegetation association 1413 retains over 30% of its pre-European extent at all scales. Vegetation association 8 retains approximately 50% of its pre-European extent at the state scale but only 14% in the IBRA bioregion and subregion.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #2e7d32; color: white;"> <th>Pre-European Vegetation Association</th> <th>Scale</th> <th>Pre-European (ha)</th> <th>Current Extent (ha)</th> <th>% Remaining</th> <th>% Remaining in DBCA reserves</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Veg Assoc No. 8</td> <td>Statewide</td> <td>694,638.14</td> <td>346,425.77</td> <td>50%</td> <td>7%</td> </tr> <tr> <td>IBRA Bioregion Avon Wheatbelt</td> <td>356,571.81</td> <td>50,640.31</td> <td>14%</td> <td>1%</td> </tr> <tr> <td>IBRA Sub-region Merredin</td> <td>353,871.79</td> <td>49,941.57</td> <td>14%</td> <td>1%</td> </tr> <tr> <td>Local Government Authority Shire of Yilgarn</td> <td>163,920.73</td> <td>59,992.64</td> <td>37%</td> <td>7%</td> </tr> </tbody> </table>	Pre-European Vegetation Association	Scale	Pre-European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves	Veg Assoc No. 8	Statewide	694,638.14	346,425.77	50%	7%	IBRA Bioregion Avon Wheatbelt	356,571.81	50,640.31	14%	1%	IBRA Sub-region Merredin	353,871.79	49,941.57	14%	1%	Local Government Authority Shire of Yilgarn	163,920.73	59,992.64	37%	7%
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	IBRA Sub-region Merredin	353,871.79	49,941.57	14%	1%																							
	Local Government Authority Shire of Yilgarn	163,920.73	59,992.64	37%	7%																							

	Veg Assoc No. 1413	Statewide	1,679,916.32	1,286,855.48	77%	13%
		IBRA Bioregion Avon Wheatbelt	546,675.55	174,102.84	32%	2%
		IBRA Sub-region Merredin	546,675.55	174,102.84	32%	2%
		Local Government Authority Shire of Yilgarn	538,791.10	395,458.48	37%	19%
<p>It is noted from aerial imagery that the project area is situated in a wide corridor of remnant vegetation. The width of this corridor ranges between 100 m to 500 m and comprises Vacant Crown Land, redundant road reserve and freehold land. There are also large patches of remnant native vegetation that are adjacent to the project area, for example in the Noongar townsite and on freehold land between SLK 335 and 336. The clearing may reduce the extent of native vegetation along GEH, however generally there will be a vegetation corridor retained on one, or both sides of the road. Therefore, the proposed clearing is not likely to diminish any linkages of native vegetation across the landscape.</p> <p>Noting the proposal area contains an under-represented vegetation association, and occurs in an extensively cleared landscape, the proposed clearing is considered at variance to this principle. Impacts to remnant native vegetation as a result of the clearing will be managed by the implementation of an offset.</p>						
Methodology	Commonwealth of Australia (2001) Government of Western Australia (2019) GIS Database: - Pre-European Vegetation					

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Comments	Proposed clearing is at variance to this Principle
	<p>One minor non-perennial watercourse intersects the proposal area (GIS Database). This watercourse is associated with the Yilgarn River catchment, which originates north-east of Southern Cross and flows to the south-west to its confluence with the Lockhart River south of Kellerberrin (Department of Water, 2008).</p> <p>Although no vegetation within the proposal area has been mapped as riparian (GHD, 2016), it was considered that the proposal area contained vegetation growing in association with a defined water course. The area proposed to be cleared is minor in scale and nature (>0.01 ha), with the clearing proposed not expected to impact the values of this watercourse.</p> <p>There are no wetlands within the vicinity of the proposal area (GIS Database).</p> <p>Based on the above, the proposed clearing is at variance to this principle.</p>
Methodology	Department of Water (2008) GHD (2016)

	GIS Database: - DWER Shapefiles
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(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Comments	Proposed clearing is not likely to be at variance to this Principle
	<p>Natural Resource Management Soil Systems and CSIRO risk mapping indicates the soils of the proposal area have generally low to moderate risk of land degradation; with a moderate to high risk of wind erosion. Given the linear nature of the clearing and sealing of areas for road construction, the proposed clearing is not likely to lead to an appreciable increase in land degradation. Standard erosion and dust management control measures will be implemented during construction to reduce the incidence of wind erosion.</p> <p>Based on the above, the proposed clearing is not likely to be at variance to this principle.</p>
Methodology	GIS Database: - CSIRO Acid Sulphate Soils risk mapping - Natural Resource Management SLIP Soil Systems

(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.

Comments	Proposed clearing is not at variance to this Principle
	<p>There are no DBCA managed lands in the vicinity of the project area (GIS Database). The nearest DBCA managed land are two un-named nature reserves approximately 12 km west and south of the project area. At this distance, the proposed clearing is not expected to impact on the values of these reserves.</p> <p>Reserve R 27422, which is vested in the Department of Planning, Lands and Heritage for the purpose of landscape protection, is located approximately 1.5 km east of the proposal area. Reserve R 2863, which is vested in the Minister for Water for the purposes of Water Catchment and Conservation of Flora and Fauna, is located approximately 2.5 km east of the proposal area. The proposed clearing of 8.48 ha of native vegetation along 13 km of road will not remove or diminish any ecological linkages or buffers around these reserves. No other impacts to these reserves are expected.</p> <p>Based on the above, the proposed clearing is not at variance to this principle.</p>
Methodology	GIS Database - Cadastre - DBCA Managed Lands

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Comments	Proposed clearing is not likely to be at variance to this Principle
	<p>There are a small number of minor, non-perennial watercourses within the study area, including one watercourse that intersects the proposal area (GIS Database). Given the nature of the works and that no surface water will be taken for this project, it is unlikely that there will be any change to the water quality of this area.</p> <p>The project is not located within a Public Drinking Water Source Area.</p> <p>Dewatering is unlikely to be required during construction and clearing of a relatively small area of native vegetation over a long distance is not likely to impact on groundwater quality.</p> <p>Given the above, it is unlikely that this proposal will cause any deterioration in the quality of surface or underground water.</p> <p>Based on the above, the proposed clearing is not likely to be at variance to this principle.</p>
Methodology	GIS Database: - DWER Shapefiles

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Comments	Proposed clearing is not likely to be at variance to this Principle
	<p>The study area averages 320 mm of rainfall per year (BOM, 2020) and the desktop assessment identified that there is a low risk of waterlogging or flooding in the area, as discussed in principle (g).</p> <p>Accordingly, the relatively small area of clearing (8.48 ha) along 13 km of existing road is unlikely to cause or exacerbate the incidence or intensity of flooding.</p>
Methodology	BOM (2020)

6 SUMMARY OF BIOLOGICAL SURVEYS

GHD (2016) Great Eastern Highway – Merredin to Southern Cross SLK 258.5 - 365.5 – Biological Assessment.

A full biological survey of GEH between Merredin and Southern Cross. Fieldwork was undertaken from 7 to 12 October 2015 and a follow-up targeted conservation significant flora survey was conducted on 20 January 2016.

The key findings have been summarised below:

- The vegetation types recorded in the survey area were not considered well represented in the local or regional area on account of the extensive clearing undertaken in the Wheatbelt.
- Eucalypt woodland vegetation types were inferred to represent Eucalypt Woodlands of the Western Australian Wheatbelt TEC. This TEC also aligns with the Priority 3 PEC Eucalypt Woodlands of the WA Wheatbelt. The total area of mapped was 166.48 ha, including approximately 1.96 ha along this section of GEH.
- One Threatened Flora species was recorded (*Eremophila resinosa*). This species was not found in the proposal area.
- Six Priority flora species were recorded in survey area. None of these species were found in the proposal area:
 - *Acacia subrigida* (Priority 2);
 - *Acacia ancistrophylla* var. *perarcuata* (Priority 3);
 - *Acacia crenulata* (Priority 3);
 - *Leucopogon* sp. Ironcaps (N.Gibson & K. Brown 3070) (Priority 3);
 - *Verticordia mitodes* (Priority 3); and
 - *Acacia filifolia* (Priority 3).
- Two conservation significant fauna species were recorded, Malleefowl (road-kill) and Rainbow Bee-eater. No significant habitat (mounds) for Malleefowl was recorded in the survey.
- Suitable habitat for Carnaby's cockatoo was recorded. A total of 506 trees with suitable DBH were recorded, 26 of which contained hollows suitable for breeding. There were no signs of current or historical use. One suitable DBH tree occurs in the proposal area.

Astron (2018) Great Eastern Highway – Merredin to Southern Cross SLK 258.5 - 365.5 – Biological Assessment

Astron conducted a targeted Eucalypt Woodlands of the Western Australian Wheatbelt TEC assessment of Great Eastern Highway between Merredin and Southern Cross to confirm areas inferred by GHD (2016), and identify any patches of TEC not previously recorded. Astron targeted Eucalypt dominated vegetation types and assessed the vegetation against the diagnostic criteria and condition thresholds for the TEC.

The key findings have been summarised below:

- 76 sites were confirmed to meet the criteria for Eucalypt Woodlands TEC.
- The total area of Eucalypt Woodlands TEC mapped between Walgoolan and Southern Cross was 109.1 ha, including approximately 0.14 ha of Eucalypt Woodlands TEC mapped in the proposal area.

Ecologia (2019a) Great Eastern Highway 327 – 365.8 SLK Desktop Assessment

**Ecologia (2019b) Great Eastern Highway - Walgoolan to Southern Cross Package 6 to 8:
SLK 327 to 365.8 – Targeted Flora Survey**

Ecologia conducted a targeted flora survey to identify locations and abundance of the conservation significant flora species between SLK 327 to 365.8. The survey comprised a desktop assessment to determine species likely or possible to occur based on the habitat types mapped by GHD (2016), and a field survey conducted between 23 and 27 September 2019. The survey did not record any occurrences of Threatened or Priority flora within the survey area.

7 ADDITIONAL ACTIONS REQUIRED

Table 6 summarises what further pre-clearing impact assessment and vegetation management is required in accordance with CPS 818.

Table 6. Summary of Additional Management Actions Required by CPS 818

Impact of Clearing	Yes/No or NA	Further Action Required
<p>1. The Assessment Report indicates that the clearing is 'Seriously at Variance', At Variance' or 'May be at Variance' with one or more of the clearing principles.</p>	<p>Yes</p>	<p>1. Submissions are required to be sought from relevant parties. 2. A VMP is required. This VMP is provided as Appendix B of this AR. 3. An offset is required. The offset proposal is provided separately. In summary, Main Roads proposes to contribute \$142,785 to the State Offset Fund for the rehabilitation of 25.05 ha of native vegetation.</p>
<p>2. The Assessment Report indicates that the clearing is at variance or may be at variance with clearing principle (g) land degradation, (i) surface or underground water quality or (j) the incidence of flooding.</p>	<p>No</p>	<p>No further action required.</p>
<p>3. The project involves clearing for temporary works (as defined by the permit under Condition 11 of CPS 818).</p>	<p>No</p>	<p>No further action required.</p>
<p>4a. The project is in part of a region that has annual rainfall greater than 400mm and is south of the 26th parallel of latitude. 4b. The project will require movement of soil in conditions other than dry conditions.</p>	<p>No</p>	<p>4a. No further action required.</p>
<p>5. Main Roads has been notified by DWER or an environmental specialist that the area to be cleared is susceptible to a pathogen other than dieback</p>	<p>No</p>	<p>No further action required.</p>
<p>6. The proposal requires referral to either the WA EPA or the Commonwealth DAWE.</p>	<p>No</p>	<p>No further action required.</p>
<p>7a. The vegetation within the area to be cleared and/or the surrounding vegetation in a good or better condition</p>	<p>Yes</p>	<p>7a Yes, go to number 7b</p>

<p>7b. Are weeds likely to spread to and result in environmental harm to adjacent areas of native vegetation that are in good or better condition</p>	<p>No</p>	<p>7b VMP/CEMP requires that all vehicles and machinery arrive on site clean and remain within the extent of the demarcated clearing line. Therefore, the risks associated with potential weed spread are low.</p>
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8 STATEMENT ADDRESSING STAKEHOLDER SUBMISSIONS

Main Roads attempts to engage with all relevant stakeholders for each of its projects. Table 7 highlights the consultation that has been undertaken so far for this proposal.

Main Roads will also be seeking online submissions from interested stakeholders for this proposal as it is at variance with at least one of the ten clearing principles. Responses to submissions will also be published online.

Table 7. Summary of stakeholders consulted to date

Name	Position	Agency
Adrian Wiley	Senior Manager	DWER, Native Vegetation Conservation Branch
Peter Clarke	Chief Executive Officer	Shire of Yilgarn
Landowners of the land where clearing is proposed, where the clearing is proposed outside of the road reserve.		

The summary of the consultation Main Roads has undertaken to date with the Department of Water and Environmental Regulation is shown in Table 8.

Table 8. Summary of Main Roads Response to Stakeholder Submissions

Key Issue	Main Roads Response
DWER initially assessed the proposed clearing as may be at variance to clearing principle (a). This was based on the proposal removing 0.14 ha of Eucalypt Woodlands TEC.	Main Roads has undertaken ground-truthing to refine the area of Eucalypt Woodlands TEC in the proposal area to 0.01 ha. Main Roads has clarified this aspect of the assessment with DWER. DWER agreed with the assessment that the proposed clearing was not likely to be at variance to principle (a).
DWER assessed the proposed clearing at variance with principle (f), as the proposal area intersects the Yilgarn River.	Main Roads has adopted this level of variance and amended the Assessment Report accordingly.
The offset proposal initially proposed a financial contribution to the State Offset Fund to purchase land for conservation. Noting the proposal occurs in an extensively cleared landscape, DWER requested an alternative offset.	Main Roads has amended the offset proposal to a financial contribution to the State Offset Fund for the purpose of rehabilitating degraded native vegetation.

9 VEGETATION MANAGEMENT

Main Roads will avoid clearing native vegetation where possible. Where clearing cannot be avoided then this clearing is kept to a minimum. A VMP has been developed to manage and minimise vegetation clearing for the proposal (refer to Appendix B).

10 REFERENCES

Astron (2018) Great Eastern Highway – Merredin to Southern Cross SLK 258.5 – 365.5 Biological Assessment, September 2018. Report prepared for Main Roads WA, by Astron Environmental Services.

Bureau of Meteorology Australia (2020) Climate Averages for Australian Sites – Noongaar – Available online from <http://www.bom.gov.au/climate/data/index.shtml>. Accessed 20/12/2019.

Commonwealth of Australia (2001) National Objectives and Targets for Biodiversity Conservation 2001 – 2005. Commonwealth of Australia, Canberra.

DAWE (2020a) Protected Matters Search Tool. Department of Agriculture, Water and the Environment, Canberra. Available from <http://www.environment.gov.au/epbc/protected-matters-search-tool>. Accessed 21/05/2020.

DAWE (2020b) *Calidris ferruginea* in Species Profile and Threats Database. Department of Agriculture, Water and the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>.

DAWE (2020c) *Idiosoma nigrum* in Species Profile and Threats Database. Department of Agriculture, Water and the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>.

DAWE (2020d) *Calyptorhynchus latirostris* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: <http://www.environment.gov.au/sprat>.

Department of Biodiversity, Conservation and Attractions (2020) NatureMap: Mapping Western Australia's Biodiversity. Department of Parks and Wildlife. <https://naturemap.dpaw.wa.gov.au/>. Accessed 21/05/2020.

Department of Environment and Conservation (2012) Chuditch (*Dasyurus geoffroii*) Recovery Plan. Wildlife Management Program No. 54. Department of Environment and Conservation, Perth, Western Australia. Available from: <http://www.environment.gov.au/biodiversity/threatened/recoveryplans/dasyurus-geoffroii-2012>.

Department of Water (2008) Riparian condition of the Yilgarn River: Caroline Gap to Hines Hill. Report No. WRM 49. Department of Water, Western Australia.

Ecologia (2019a) Great Eastern Highway 327 – 365.8 SLK Desktop Assessment. Report prepared for Main Roads WA, by Ecologia Environment.

Ecologia (2019b) Great Eastern Highway Walgoolan to Southern Cross Package 6 to 8: SLK 327 to 365.8 – Targeted Flora Survey. Report prepared for Main Roads WA, by Ecologia Environment.

Environmental Protection Authority (2016) Technical Guide – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (eds. K Freeman, G Stack, S Thomas and N Woolfrey). Perth, Western Australia.

GHD (2016) Great Eastern Highway – Merredin to Southern Cross SLK 258.5–365.5 Biological Assessment. Report prepared for Main Roads WA, by GHD.

Government of Western Australia (2019) 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions, Perth. Available online from:
<https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics>.

Western Australian Herbarium (1998) FloraBase - The Western Australian Flora. Department of Biodiversity, Conservation and Attractions. Available online from: <https://florabase.dpaw.wa.gov.au/>
Accessed 18/10/2019.

11 APPENDICES

Appendix	Title
Appendix A	Areas of Eucalypt Woodlands TEC/PEC near the project area
Appendix B	Vegetation Management Plan
Appendix C	NatureMap results report

Appendix A: Areas of Eucalypt Woodlands TEC/PEC near the proposal area



Figure A-1

TEC mapping includes a stand of *Eucalyptus* regrowth (photo 1, foreground). This area was previously cleared in 2007 for works along this section of GEH. Proposal area excludes this vegetation.

Proposal area avoids mature Eucalypt shown in photo 2.

(Photo source: Google, capture date March 2020)

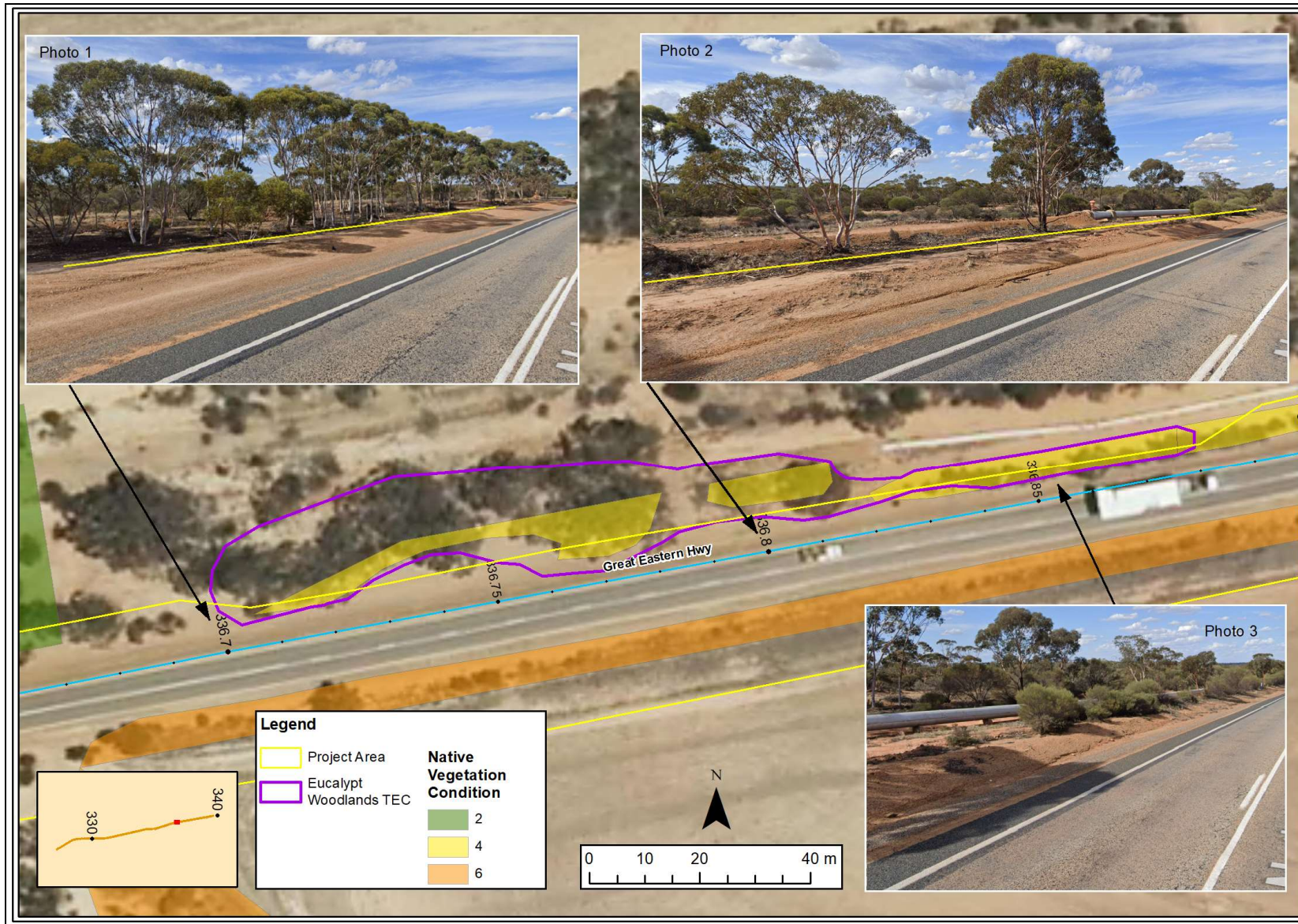


Figure A-2

Project disturbance will not go beyond tree line shown in photos 1 and 2 (yellow), except for the removal of one *Eucalyptus* sapling.

Some minor clearing of vegetation shown in photo 3. Although TEC and vegetation type mapping includes this area in a Eucalypt woodlands community, it likely forms part of a transition into the adjacent *Acacia* spp. and *Melaleuca* spp. tall shrublands community.

(Photo source: Google, capture date March 2020)



Figure A-3

TEC mapping includes areas between Goldfields Pipeline and GEH. No clearing is required here, as shown in photos 1 and 2.

Some clearing of *Acacia* spp. and *Melaleuca* spp. tall open shrubland will occur on the north side of GEH, which is not representative of the Eucalypt Woodlands TEC.

(Photo source: Google, capture date March 2020)

Appendix B: Vegetation Management Plan

GREAT EASTERN HIGHWAY UPGRADE SLK 327 TO 339.8

Purpose and Scope

This Vegetation Management Plan (VMP) has been prepared by Main Roads for the purpose of managing native vegetation clearing impacts associated with the GEH Upgrade SLK 327 to 339.8 project.

The project consists of the following components:

- 13 km of road widening and upgrade;
- Drainage infrastructure improvements;
- Upgrades to existing crossovers.

In specified circumstances, a Main Roads VMP is required to be approved by Department of Water and Environmental Regulation (DWER) as a condition of Main Roads Statewide Clearing Permit CPS 818.

Action

Appendix B1 contains the standard Principal Environmental Management Requirements (PEMRs) that will be utilised for all projects that involve clearing to avoid, mitigate and manage the environmental impacts of the project.

Project Specific Environmental Management Requirements are contained in Appendix B2.

Timeframes

Actions shall be undertaken in accordance with those described in the relevant PEMR and the Project Specific Environmental Management Requirements.

Responsibilities

It is the responsibility of the Superintendent's Contract Management Team that the requirements are implemented by the Contractor. This shall be done by adhering to the Environmental Measurement and Evaluation Checklist.

Appendix B1 – Principal Environmental Management Requirements (PEMR’s)

B1.1 Clearing

STANDARD MANAGEMENT REQUIREMENTS
<p>PRE WORKS</p> <ol style="list-style-type: none"> 1. The Contractor must prepare, implement and maintain processes to ensure that the movement of all vehicles, plant and machinery does not occur outside of the approved Limits of Vegetation Clearing (This must include all turnaround areas). 2. The Contractor must minimise vegetation clearing and the area of disturbance on ground by utilising existing cleared areas, where possible. 3. The Contractor must undertake pegging in accordance with the requirements detailed in Specification 301 and illustrated on Drawing 201928-0001 for Main Roads Construction Peg Colour Codes (HOLD POINT), which specifically includes: <ol style="list-style-type: none"> a. PINK flagging tape for the Limits of Vegetation Clearing Boundary; b. WHITE flagging tape for vegetation to be retained; c. WHITE flagging tape for trees to be retained with PINK flagging tape on tree limb to be removed; d. PINK and BLACK flagging tape to demarcate the boundary of heritage areas, and e. ORANGE and WHITE flagging tape with the knot facing the infestation to demarcate dieback infested areas
<p>DURING WORKS</p> <ol style="list-style-type: none"> 1. The Contractor must ensure all works remain within the Limits of Vegetation Clearing boundary. 2. The Contractor must maintain the site pegging and flagging to demarcate the Limit of Clearing for the duration of the Works. 3. The Contract must report any soil or vegetation disturbance beyond the Limit of Clearing to the Superintendent as an Environment Incident using EQSafe. 4. The Contractor must ensure staff, vehicle and plant movements are confined to the Limit of Clearing during the Works. 5. The Contractor must undertake the clearing in accordance with the Fauna PEMR. 6. The Contractor must ensure that all pruning operations of any vegetation for hazard reduction and/or selective thinning of branches must be undertaken in accordance with AS 4373 - 2007 <i>Pruning of amenity trees</i>. 7. The Contractor must ensure that branches protruding into the cleared area must be neatly pruned back by hand close to the trunk of the tree or main branches to minimise the disturbance to vegetation growing outside the Limit of Clearing. 8. The Contractor must avoid clearing and topsoil movement during wet soil conditions, when possible.
<p>POST WORKS - NIL</p>

B1.2 Erosion and Sedimentation Control

STANDARD MANAGEMENT REQUIREMENTS
<p>PRE WORKS</p> <ol style="list-style-type: none"> 1. The Contractor must develop, implement and maintain processes and procedures to ensure construction works: <ol style="list-style-type: none"> a. are responsive to; and addresses incidents of erosion and sedimentation within and adjacent to work areas; b. prevents watercourse sedimentation and siltation; c. prevents, minimises and mitigates sedimentation and siltation of drainage lines due to riparian vegetation removal; d. minimise exposed soil working surfaces and protects loose surfaces and recently cleared areas from wind erosion; e. stockpile gravel, crushed rock and excavated material away from drainage paths; and f. monitors water quality if the CEMP identifies turbidity and sedimentation as an issue for the project works.
<p>DURING WORKS</p> <ol style="list-style-type: none"> 1. The Contractor must implement, monitor and adhere to the pre-construction requirements for erosion and sedimentation management actions. 2. The Contractor must implement erosion and sedimentation control methods during the works, such that no unreasonable erosion and sedimentation occurs,
<p>POST WORKS</p> <ol style="list-style-type: none"> 1. The Contractor must ensure that disturbed areas are stabilised as soon as practicable after construction activities are completed.

B1.3 Fauna

STANDARD MANAGEMENT REQUIREMENTS
<p>PRE WORKS</p> <ol style="list-style-type: none"> 1. The Contractor must communicate fauna management requirements to staff undertaking the clearing works during the induction and pre-start meeting/s. 2. Where active nests, burrows or dens are identified, works must not proceed until the Contractor obtains the Superintendent’s direction for their management.
<p>DURING WORKS</p> <ol style="list-style-type: none"> 1. The Contractor must undertake the clearing in the following manner to allow fauna to move out of the clearing area; <ol style="list-style-type: none"> i. Prior to the clearing activities commencing, use machinery to tap large trees with habitat hollows to encourage any animals evacuate. ii. Undertake the clearing in one direction and towards areas of native vegetation to allow the animals to escape to adjacent habitat. 2. The Contractor must ensure that all onsite personnel undertake visual monitoring and are vigilant to the presence of fauna. Any sightings of fauna, including injury or fatality, must be reported as an Environmental Incident via EQSafe.

3. The Contractor must ensure that:
 - i. No pets, traps or firearms are brought into the project area.
 - ii. Fauna are not fed.
 - iii. Fauna are not intentionally harmed or killed.
 - iv. Trenches that have no escape route at one end must be temporarily fenced to protect fauna from falling into the trench during non-work hours.
 - v. Scramble mats or escape ramps must be installed in trenches or excavations that have the potential to cause fauna entrapment.
 - vi. Trenches must be inspected each morning to ensure that no native fauna is trapped within open trenches.
 - vii. Fauna that venture into the work area are encouraged to leave in a manner that does not harm the animal or operator (loud noise, slowly approaching in a vehicle etc.).
4. The Contractor must contact the WILDCARE Helpline on (08) 9474 9055 or the WERTWA (0437 483 175) for assistance if sick, injured or orphaned native wildlife are found on site.

POST WORKS

1. The Contractor must provide any records of fauna interaction to the Superintendent.

B1.4 Machinery and Vehicle Management

STANDARD MANAGEMENT REQUIREMENTS

PRE WORKS

1. The Contractor must ensure that all vehicles, machinery and plant are clean on entry (i.e. free of all soil and vegetation material) and comply with the requirements of 204.B.32 Side-tracks and Temporary Access Tracks.
2. The Contractor must ensure that all staff are suitably qualified and competent to undertake works, especially refuelling activities.

DURING WORKS

1. The Contractor must ensure that all areas associated with the storage, parking, servicing, wash down and refuelling of all vehicles, plant and machinery are located within designated areas which are approved by the Superintendent prior to works commencing.
2. The Contractor must ensure that vehicle servicing and refuelling will be undertaken at designated areas approved by the Superintendent.
3. The Contractor must maintain records of checking all vehicles, machinery and plant are clean on entry.

POST WORKS

1. The Contractor must submit records of checking all vehicles, machinery and plant are clean on entry to the Superintendent.

B1.5 Mulch and Topsoil Management

STANDARD MANAGEMENT REQUIREMENTS
<p>PRE WORKS</p> <ol style="list-style-type: none"> 1. The Contractor shall seek Superintendent approval which areas of topsoil and vegetation are to be regarded as poor or good quality for separate collection, handling and stockpiling. 2. The Contractor must ensure that poor quality topsoil and mulched vegetation do not contaminate good quality topsoil and vegetation. 3. The Contractor must ensure that the movement of soil and vegetation is only undertaken in dry conditions, unless otherwise approved and / or directed by the Superintendent.
<p>DURING WORKS</p> <ol style="list-style-type: none"> 1. The Contractor must ensure that all machinery used in the removal of weed/dieback-infested topsoil is cleaned down before and between operations to prevent the introduction and spread of weeds/dieback. 2. The Contractor must ensure that weed and dieback infected topsoil and mulch vegetation is handled separately and signposted to minimise the risk of spreading dieback and weed species across the site and stockpiles. 3. The Contractor must ensure that stockpiling operations occur in a manner that ensures the properties of the topsoil are not degraded and the topsoil made unsuitable for use in revegetation.
<p>POST WORKS</p> <p>Nil.</p>

B1.6 Pegging and Flagging

STANDARD MANAGEMENT REQUIREMENTS
<ol style="list-style-type: none"> 1. The Contractor must clearly communicate to staff what the sites Pegging and Flagging represents, at the pre-start meeting/s, or equivalent. 2. The Contractor must ensure clear maps are available to all staff on site, indicating the Limits of Vegetation Clearing area/s and describing the CEMP requirements to staff undertaking the works.
<p>DURING WORKS</p> <ol style="list-style-type: none"> 1. The Contractor must undertake pegging in accordance with the requirements detailed in Specification 301 and illustrated on Drawing 201928-0001 for Main Roads Construction Peg Colour Codes (HOLD POINT), which specifically includes: <ol style="list-style-type: none"> a. PINK flagging tape for the Limits of Vegetation Clearing Boundary; b. WHITE flagging tape for vegetation to be retained; c. WHITE flagging tape for trees to be retained with PINK flagging tape on tree limb to be removed; d. PINK and BLACK flagging tape to demarcate the boundary of heritage areas, and

- e. ORANGE and WHITE flagging tape with the knot facing the infestation to demarcate dieback infested areas.

POST WORKS

- 1. The Contractor must remove and dispose of appropriately any demarcation, pegging or flagging once project works are completed.

B1.7 Water Drainage Management

STANDARD MANAGEMENT REQUIREMENTS

PRE WORKS

- 1. Use pollution control and containment strategies for project activities in Public Drinking Water Source Areas (PDWSAs) / Underground Water Pollution Control Areas (UWPCAs) and liaise with the DWER where necessary

DURING WORKS

- 1. Existing natural drainage paths and channels along the road or the vicinity of the project area will not be unnecessarily blocked or restricted.
- 2. Temporary drainage systems may be installed to carry surface water away from the areas where excavation and foundation construction work is taking place or from any other area where the accumulation of water could cause delay or damage to the work.
- 3. Maintain these drainage systems in proper working order at all times.
- 4. Runoff from disturbed areas must be managed to minimise adverse impacts on surrounding vegetation, watercourses and properties.
- 5. Booms and silt fences must be used when working over or adjacent to areas of surface water in order to protect the quality of surface water from construction impacts.

POST WORKS

- 1. Water quality monitoring to be undertaken (if turbidity/ sedimentation is an issue).
- 2. Prior to backfilling the completed pipe work certify that the entire system is flushed clean and tested
- 3. Disturbed areas will be stabilised soon after construction activities are completed.
- 4. Culvert and drainage structures will be free of all grass, weeds, silt and debris

B1.8 Weed Management

STANDARD MANAGEMENT REQUIREMENTS

PRE WORKS

- 1. The Contractor must remove or kill any weeds growing in project area that are likely to spread and result in environmental harm to adjacent areas of native vegetation that are in good or better condition.

2. The Contractor must develop, implement and maintain procedures to identify and control declared and invasive weed species within the Contract areas, to the satisfaction of the Superintendent.
3. The Contractor must prepare a weed control program, for nominated weed species for control and disposal, to the satisfaction of the Superintendent.
4. The Contractor must undertake weed management in Stockpiles as directed by the Superintendent.

DURING WORKS

5. The Contractor must implement the weed control procedures and management plan and record and manage records of its implementation.
6. The Contractor must treat nominated weed infestations as many times as necessary to control and eradicate the weed species in accordance with the approved weed control program
7. The contractor must ensure that no known weed, pest or diseased affected soil, mulch, fill or other material is brought into the Site.

POST WORKS –

The relevant [Vegetation Maintenance Record Sheets](#) available at:

<https://www.mainroads.wa.gov.au/BuildingRoads/Contracting/Pages/ReportingForms.aspx> must be completed and sent to the Superintendent.

Appendix B2 – Specific Environmental Management Actions

TABLE 1 SPECIFIC MANAGEMENT ACTIONS – CLEARING PRINCIPLE (A) AND (E)

SPECIFIC ENVIRONMENTAL MANAGEMENT REQUIREMENTS
Once final design is complete, identify, demarcate on site and retain any areas of native vegetation within the approved clearing area that can be retained.
When working near Eucalypt Woodlands TEC, the boundary of the TEC will be clearly demarcated on site as an exclusion zone to prevent accidental entry or disturbance.

Appendix C: DBCA NatureMap Search Results



NatureMap Species Report

Created By Guest user on 21/05/2020

Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Line'
Vertices	31° 20' 48" S, 118° 56' 28" E 31° 20' 04" S, 118° 57' 41" E 31° 19' 53" S, 118° 58' 03" E 31° 19' 57" S, 118° 58' 48" E 31° 19' 56" S, 118° 59' 20" E 31° 19' 46" S, 119° 00' 01" E 31° 19' 30" S, 119° 01' 06" E 31° 19' 26" S, 119° 02' 02" E 31° 19' 06" S, 119° 03' 06" E 31° 18' 49" S, 119° 04' 47" E
Group By	Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	471	1438
Other specially protected fauna	1	1
Priority 1	2	4
Priority 3	8	14
Priority 4	1	5
Rare or likely to become extinct	2	51
TOTAL	485	1513

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Rare or likely to become extinct				
1.	11294 <i>Eucalyptus crucis</i> subsp. <i>crucis</i> (Silver Mallee)		T	
2.	24557 <i>Leipoa ocellata</i> (Malleefowl)		T	
Other specially protected fauna				
3.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
Priority 1				
4.	7062 <i>Glossostigma trichodes</i>		P1	
5.	33960 <i>Parartemia contracta</i> (A brine shrimp (Wheatbelt))		P1	
Priority 3				
6.	14623 <i>Acacia crenulata</i>		P3	
7.	3337 <i>Acacia filifolia</i>		P3	
8.	7831 <i>Angianthus micropodioides</i>		P3	
9.	32516 <i>Banksia horrida</i> (Prickly Dryandra)		P3	
10.	14457 <i>Hibbertia glabruscula</i>		P3	
11.	29138 <i>Lepidosperma</i> sp. Pigeon Rocks (H. Pringle 30237)		P3	
12.	48267 <i>Rinzia triplex</i> (Triad Rinzia)		P3	
13.	12442 <i>Verticordia mitodes</i>		P3	
Priority 4				
14.	6197 <i>Myriophyllum petraeum</i> (Granite Myriophyllum)		P4	
Non-conservation taxon				
15.	3200 <i>Acacia acuminata</i> (Jam, Mangard)			
16.	3201 <i>Acacia acutata</i>			
17.	3218 <i>Acacia anfractuosa</i>			
18.	15467 <i>Acacia assimilis</i> subsp. <i>assimilis</i>			
19.	3236 <i>Acacia beauverdiana</i> (Pukkati)			
20.	16117 <i>Acacia consanguinea</i>			
21.	3269 <i>Acacia coolgardiensis</i> (Spinifex Wattle)			
22.	16169 <i>Acacia deficiens</i>			
23.	3301 <i>Acacia dielsii</i>			
24.	16168 <i>Acacia enervia</i> subsp. <i>enervia</i>			
25.	3324 <i>Acacia erinacea</i>			
26.	16127 <i>Acacia granitcola</i>			
27.	3366 <i>Acacia hemiteles</i>			
28.	3389 <i>Acacia intricata</i>			
29.	3393 <i>Acacia jennerae</i>			
30.	3408 <i>Acacia lasiocalyx</i> (Silver Wattle, Wilyurwur)			
31.	3432 <i>Acacia mackeyana</i>			

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Department of Biodiversity, Conservation and Attractions





Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
32.	3440 <i>Acacia merrallii</i>			
33.	3452 <i>Acacia murrayana</i> (Sandplain Wattle)			
34.	15290 <i>Acacia neurophylla</i> subsp. <i>erugata</i>			
35.	15479 <i>Acacia nigripilosa</i> subsp. <i>nigripilosa</i>			
36.	3495 <i>Acacia prairii</i> (Prain's Wattle)			
37.	3522 <i>Acacia rigens</i> (Nealie)			
38.	3524 <i>Acacia rossei</i>			
39.	30033 <i>Acacia saligna</i> subsp. <i>lindleyi</i>			
40.	3539 <i>Acacia sericocarpa</i>			
41.	3542 <i>Acacia sessilispica</i>			
42.	30551 <i>Acacia</i> sp. <i>Moorine Rock</i> (B.R. Maslin 4474)			
43.	14031 <i>Acacia</i> sp. <i>P69</i> (W.E. Blackall 3754)			
44.	23525 <i>Acacia steedmanii</i> subsp. <i>steedmanii</i>			
45.	15292 <i>Acacia yorkkrakensis</i> subsp. <i>acrita</i>			
46.	24559 <i>Acanthagenys rufogularis</i> (Spiny-cheeked Honeyeater)			
47.	24260 <i>Acanthiza apicalis</i> (Broad-tailed Thornbill, Inland Thornbill)			
48.	24261 <i>Acanthiza chrysorrhoa</i> (Yellow-rumped Thornbill)			
49.	24265 <i>Acanthiza uropygialis</i> (Chestnut-rumped Thornbill)			
50.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
51.	25544 <i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
52.	13904 <i>Allocaeusuarina acutivalvis</i> subsp. <i>acutivalvis</i>			
53.	1721 <i>Allocaeusuarina campestris</i>			
54.	1722 <i>Allocaeusuarina corniculata</i>			
55.	1731 <i>Allocaeusuarina huegeliana</i> (Rock Sheoak, Kwowi)			
56.	12655 <i>Allocaeusuarina spinosissima</i>			
57.	6565 <i>Alyxia buxifolia</i> (Dysentery Bush)			
58.	12025 <i>Amphipogon caricinus</i> var. <i>caricinus</i>			
59.	<i>Aname mainae</i>			
60.	40904 <i>Androcalva stowardii</i>			
61.	6945 <i>Anthocercis genistoides</i>			
62.	24561 <i>Anthochaera carunculata</i> (Red Wattlebird)			
63.	17963 <i>Aotus tietkensis</i>			
64.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
65.	2992 <i>Arabidella trisecta</i>			
66.	7838 <i>Arctotheca calendula</i> (Cape Weed, African Marigold)	Y		
67.	24610 <i>Ardeotis australis</i> (Australian Bustard)			
68.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
69.	24353 <i>Artamus cyanopterus</i> (Dusky Woodswallow)			
70.	7845 <i>Asteridea asteroides</i>			
71.	7846 <i>Asteridea athrixioides</i>			
72.	11489 <i>Atriplex acutibractea</i> subsp. <i>karoniensis</i>			
73.	38764 <i>Austropaxillus muelleri</i>			
74.	17237 <i>Austrostipa elegantissima</i>			
75.	17238 <i>Austrostipa eremophila</i>			
76.	17246 <i>Austrostipa nitida</i>			
77.	19588 <i>Austrostipa nodosa</i>			
78.	17250 <i>Austrostipa pycnostachya</i>			
79.	17251 <i>Austrostipa scabra</i>			
80.	17257 <i>Austrostipa variabilis</i>			
81.	5349 <i>Baeckea grandibracteata</i>			
82.	5356 <i>Baeckea muricata</i>			
83.	36038 <i>Baeckea</i> sp. <i>Koonadgin</i> (B.L. Rye & M.E. Trudgen BLR 241137)			
84.	32315 <i>Barbula calycina</i>			
85.	<i>Barnardius zonarius</i>			
86.	34257 <i>Beyeria sulcata</i> var. <i>sulcata</i>			
87.	7857 <i>Blennospora phlegmatocarpa</i>			
88.	11201 <i>Boronia ternata</i> var. <i>ternata</i>			
89.	7883 <i>Brachyscome pusilla</i>			
90.	19437 <i>Brachysola coerulea</i>			
91.	11187 <i>Brassica barrelieri</i> subsp. <i>oxyrrhina</i> (Smooth-stem Turnip)	Y		
92.	25715 <i>Cacatua roseicapilla</i> (Galah)			
93.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
94.	1614 <i>Caladenia roei</i> (Ant Orchid)			
95.	18019 <i>Caladenia vulgata</i>			
96.	2854 <i>Calandrinia granulifera</i> (Pygmy Purslane)			
97.	8466 <i>Callitris columellaris</i> (White Cypress Pine)			
98.	96 <i>Callitris preissii</i> (Rottnest Island Pine, Maro)			
99.	5408 <i>Calothamnus gilesii</i>			
100.	25717 <i>Calyptorhynchus banksii</i> (Red-tailed Black-Cockatoo)			
101.	5487 <i>Calytrix violacea</i>			

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Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
102.	32338 <i>Campylopus introflexus</i>	Y		
103.	7911 <i>Carthamus lanatus</i> (Saffron Thistle)	Y		
104.	11211 <i>Cassutha glabella forma dispar</i>			
105.	2953 <i>Cassutha melantha</i> (Large Dodder-laurel)			
106.	1121 <i>Centrolepis aristata</i> (Pointed Centrolepis)			
107.	1126 <i>Centrolepis eremica</i>			
108.	1129 <i>Centrolepis glabra</i> (Smooth Centrolepis)			
109.	24086 <i>Cercartetus concinnus</i> (Western Pygmy-possum, Mundarda)			
110.	1215 <i>Chamaeberos fimbriata</i>			
111.	5497 <i>Chamelaucium pauciflorum</i>			
112.	15130 <i>Chamelaucium pauciflorum subsp. pauciflorum</i>			
113.	42180 <i>Chamelaucium sp. Bendinger</i> (T.J. Alford 110)			
114.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
115.	47909 <i>Cheramoeca leucosterna</i> (White-backed Swallow)			
116.	6215 <i>Chlaenoscladium gardneri</i>			
117.	7925 <i>Chondrilla juncea</i> (Skeleton Weed)	Y		
118.	24289 <i>Circus assimilis</i> (Spotted Harrier)			
119.	7369 <i>Citrullus colocynthis</i>	Y		
120.	25675 <i>Colluricincla harmonica</i> (Grey Shrike-thrush)			
121.	4561 <i>Comesperma scoparium</i> (Broom Milkwort)			
122.	4566 <i>Comesperma volubile</i> (Love Creeper)			
123.	1424 <i>Conostylis bealiana</i>			
124.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
125.	<i>Cormocephalus strigosus</i>			
126.	24416 <i>Corvus bennetti</i> (Little Crow)			
127.	25592 <i>Corvus coronoides</i> (Australian Raven)			
128.	24671 <i>Coturnix pectoralis</i> (Stubble Quail)			
129.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
130.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
131.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
132.	11349 <i>Crassula decumbens var. decumbens</i>			
133.	3139 <i>Crassula exserta</i>			
134.	15706 <i>Crassula natans var. minus</i>	Y		
135.	20268 <i>Crassula tetramera</i>			
136.	25401 <i>Crinia pseudinsignifera</i> (Bleating Froglet)			
137.	32341 <i>Crossidium davidai</i>			
138.	15545 <i>Cryptandra apetala var. anomala</i>			
139.	24879 <i>Ctenophorus maculatus subsp. griseus</i> (Spotted Military Dragon)			
140.	48865 <i>Cucumis myriocarpus subsp. myriocarpus</i>	Y		
141.	<i>Culcoides sp.</i>			
142.	15400 <i>Cyanicula amplexans</i>			
143.	6747 <i>Cyanostegia angustifolia</i> (Tinsel-flower)			
144.	6751 <i>Cyanostegia microphylla</i> (Tinsel Flower)			
145.	18632 <i>Dampiera angulata subsp. angulata</i>			
146.	7438 <i>Dampiera eriocephala</i> (Woolly-headed Dampiera)			
147.	7449 <i>Dampiera juncea</i> (Rush-like Dampiera)			
148.	7451 <i>Dampiera lavandulacea</i>			
149.	7456 <i>Dampiera luteiflora</i> (Yellow Dampiera)			
150.	37041 <i>Dampiera sp. Forrestania</i> (F. Lullfitz L 4034)			
151.	7477 <i>Dampiera stenostachya</i> (Narrow-spiked Dampiera)			
152.	13159 <i>Dampiera tenuicaulis var. tenuicaulis</i>			
153.	41026 <i>Dasymalla teckiana</i>			
154.	41025 <i>Dasymalla terminalis</i> (Native Foxglove)			
155.	8977 <i>Daviesia aphylla</i>			
156.	16576 <i>Daviesia argillacea</i>			
157.	3802 <i>Daviesia croniniana</i>			
158.	3823 <i>Daviesia nematophylla</i>			
159.	16585 <i>Daviesia nudiflora subsp. nudiflora</i>			
160.	25766 <i>Delma fraseri</i> (Fraser's Legless Lizard)			
161.	6755 <i>Dicrastylis corymbosa</i>			
162.	6771 <i>Dicrastylis parvifolia</i>			
163.	2498 <i>Didymanthus roei</i>			
164.	3012 <i>Diplotaxis tenuifolia</i> (Sand Rocket)	Y		
165.	7961 <i>Dittrichia graveolens</i> (Stinkwort)	Y		
166.	4752 <i>Dodonaea adenophora</i>			
167.	4755 <i>Dodonaea bursariifolia</i>			
168.	4766 <i>Dodonaea inaequifolia</i>			
169.	11247 <i>Dodonaea viscosa subsp. angustissima</i>			
170.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
171.	13219 <i>Drosera bulbosa subsp. bulbosa</i>			



Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
172.	29207 <i>Drosera rupicola</i>			
173.	49090 <i>Drosera</i> sp. <i>Branched styles</i> (S.C. Coffey 193)			
174.	4459 <i>Drummondita hassellii</i>			
175.	24650 <i>Drymodes brunneopygia</i> (<i>Southern Scrub-robin</i>)			
176.	6681 <i>Echium plantagineum</i> (<i>Paterson's Curse</i>)	Y		
177.	<i>Elanus axillaris</i>			
178.	2510 <i>Enchylaena lanata</i>			
179.	2511 <i>Enchylaena tomentosa</i> (<i>Barrier Saltbush</i>)			
180.	32464 <i>Entosthodon subnudus</i> var. <i>subnudus</i>			
181.	<i>Eolophus roseicapillus</i>			
182.	24567 <i>Epthianura albifrons</i> (<i>White-fronted Chat</i>)			
183.	7200 <i>Eremophila drummondii</i>			
184.	7226 <i>Eremophila ionantha</i> (<i>Violet-flowered Eremophila</i>)			
185.	18570 <i>Eremophila oppositifolia</i> subsp. <i>angustifolia</i>			
186.	415 <i>Eriachne ovata</i>			
187.	20718 <i>Ericksonella saccharata</i>			
188.	45244 <i>Ericomyrtus serpyllifolia</i>			
189.	4333 <i>Erodium cicutarium</i> (<i>Common Storksbill</i>)	Y		
190.	4335 <i>Erodium cygnorum</i> (<i>Blue Heronsbill</i>)			
191.	5572 <i>Eucalyptus burracoppinensis</i> (<i>Burracoppin Mallee</i>)			
192.	12904 <i>Eucalyptus capillosa</i>			
193.	14300 <i>Eucalyptus celastroides</i> subsp. <i>celastroides</i> (<i>Mirret</i>)			
194.	11978 <i>Eucalyptus celastroides</i> subsp. <i>virella</i>			
195.	5595 <i>Eucalyptus comitae-vallis</i> (<i>Comet Vale Mallee</i>)			
196.	5607 <i>Eucalyptus corrugata</i> (<i>Rough-fruited Mallee</i>)			
197.	5611 <i>Eucalyptus cylindriflora</i> (<i>White Mallee</i>)			
198.	34811 <i>Eucalyptus distuberosa</i> subsp. <i>distuberosa</i>			
199.	42027 <i>Eucalyptus erythronema</i> subsp. <i>erythronema</i> (<i>Red-flowered Mallee</i>)			
200.	5673 <i>Eucalyptus horistes</i>			
201.	15671 <i>Eucalyptus kochii</i> subsp. <i>kochii</i>			
202.	15670 <i>Eucalyptus kochii</i> subsp. <i>plenissima</i>			
203.	13059 <i>Eucalyptus leptopoda</i> subsp. <i>leptopoda</i>			
204.	5701 <i>Eucalyptus longicornis</i> (<i>Red Morrel, Moril</i>)			
205.	13037 <i>Eucalyptus loxophleba</i> subsp. <i>lissophloia</i>			
206.	5711 <i>Eucalyptus melanoxyton</i> (<i>Black Morrel</i>)			
207.	19323 <i>Eucalyptus moderata</i>			
208.	5717 <i>Eucalyptus myriadena</i>			
209.	5742 <i>Eucalyptus petraea</i> (<i>Granite Rock Box</i>)			
210.	5745 <i>Eucalyptus pileata</i> (<i>Capped Mallee</i>)			
211.	12866 <i>Eucalyptus pluricaulis</i> subsp. <i>pluricaulis</i>			
212.	5761 <i>Eucalyptus rigidula</i> (<i>Stiff-leaved Mallee</i>)			
213.	5766 <i>Eucalyptus salmonophloia</i> (<i>Salmon Gum, Wurak</i>)			
214.	5767 <i>Eucalyptus salubris</i> (<i>Gimlet</i>)			
215.	5772 <i>Eucalyptus sheathiana</i> (<i>Ribbon-barked Gum</i>)			
216.	12881 <i>Eucalyptus subangusta</i> subsp. <i>cerina</i>			
217.	12883 <i>Eucalyptus subangusta</i> subsp. <i>subangusta</i>			
218.	13026 <i>Eucalyptus tephroclada</i>			
219.	5793 <i>Eucalyptus transcontinentalis</i> (<i>Redwood, Pungul</i>)			
220.	5802 <i>Eucalyptus yilgarnensis</i> (<i>Yorrell</i>)			
221.	24368 <i>Eurostopus argus</i> (<i>Spotted Nightjar</i>)			
222.	17027 <i>Euryomyrtus leptospermoides</i>			
223.	16722 <i>Euryomyrtus maidenii</i>			
224.	19292 <i>Eutaxia lasiophylla</i>			
225.	10977 <i>Exocarpos aphyllus</i> (<i>Leafless Ballart</i>)			
226.	25621 <i>Falco berigora</i> (<i>Brown Falcon</i>)			
227.	25622 <i>Falco cenchroides</i> (<i>Australian Kestrel, Nankeen Kestrel</i>)			
228.	25623 <i>Falco longipennis</i> (<i>Australian Hobby</i>)			
229.	32469 <i>Fissidens taylorii</i> var. <i>taylorii</i>			
230.	19701 <i>Gastrolobium aculeatum</i>			
231.	3900 <i>Gastrolobium floribundum</i> (<i>Wodjil Poison</i>)			
232.	19732 <i>Gastrolobium melanocarpum</i>			
233.	10981 <i>Gastrolobium parviflorum</i>			
234.	24959 <i>Gehyra variegata</i>			
235.	25530 <i>Gerygone fusca</i> (<i>Western Gerygone</i>)			
236.	32384 <i>Gigaspermum repens</i>			
237.	6143 <i>Glischrocaryon aureum</i> (<i>Common Popflower</i>)			
238.	47962 <i>Glyciphila melanops</i> (<i>Tawny-crowned Honeyeater</i>)			
239.	10777 <i>Gompholobium gompholobioides</i>			
240.	10969 <i>Gompholobium hendersonii</i>			
241.	<i>Gonorynchus greyi</i>			

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242.	7495 <i>Goodenia berardiana</i>			
243.	12522 <i>Goodenia glareicola</i>			
244.	7527 <i>Goodenia mimuloides</i>			
245.	7534 <i>Goodenia pinifolia</i> (Pine-leaved <i>Goodenia</i>)			
246.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
247.	1946 <i>Grevillea acacioides</i>			
248.	1971 <i>Grevillea cagiana</i> (Red Toothbrushes)			
249.	13453 <i>Grevillea didymobotrya</i> subsp. <i>didymobotrya</i>			
250.	15769 <i>Grevillea eremophila</i>			
251.	8832 <i>Grevillea excelsior</i> (Flame <i>Grevillea</i>)			
252.	19314 <i>Grevillea hookeriana</i> subsp. <i>apiciloba</i>			
253.	2018 <i>Grevillea huegelii</i>			
254.	15981 <i>Grevillea obliquistigma</i> subsp. <i>obliquistigma</i>			
255.	2055 <i>Grevillea oncogyne</i>			
256.	2057 <i>Grevillea paradoxa</i> (Bottlebrush <i>Grevillea</i>)			
257.	2077 <i>Grevillea pterosperma</i>			
258.	2104 <i>Grevillea teretifolia</i> (Round Leaf <i>Grevillea</i>)			
259.	2124 <i>Grevillea yorkrakinensis</i>			
260.	2810 <i>Gunniopsis septifraga</i>			
261.	<i>Gymnapistes marmoratus</i>			
262.	2157 <i>Hakea erecta</i>			
263.	2163 <i>Hakea francisiana</i> (Emu Tree)			
264.	2167 <i>Hakea invaginata</i>			
265.	2182 <i>Hakea minyma</i>			
266.	2184 <i>Hakea multilineata</i> (Grass Leaf <i>Hakea</i>)			
267.	19131 <i>Hakea scoparia</i> subsp. <i>scoparia</i>			
268.	6692 <i>Halgalia lavandulacea</i> (Blue Bush)			
269.	6710 <i>Heliotropium europaeum</i> (Common Heliotrope)	Y		
270.	6848 <i>Hemigenia dielsii</i>			
271.	6875 <i>Hemigenia westringioides</i> (Open <i>Hemigenia</i>)			
272.	24961 <i>Heteronotia binoei</i> (Bynoe's Gecko)			
273.	19692 <i>Hibbertia ancistrophylla</i>			
274.	5122 <i>Hibbertia eatoniae</i>			
275.	5124 <i>Hibbertia exasperata</i>			
276.	5165 <i>Hibbertia rostellata</i>			
277.	5166 <i>Hibbertia rupicola</i>			
278.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
279.	<i>Hoggicosa forresti</i>			
280.	<i>Hoggicosa storri</i>			
281.	5813 <i>Homalocalyx pulcherrimus</i>			
282.	5815 <i>Homalocalyx thryptomenoides</i>			
283.	5221 <i>Hybanthus floribundus</i>			
284.	12007 <i>Hybanthus floribundus</i> subsp. <i>floribundus</i>			
285.	8086 <i>Hypochoeris glabra</i> (Smooth Catsear)	Y		
286.	48652 <i>Hysterobaeckea petraea</i>			
287.	48655 <i>Hysterobaeckea setifera</i> subsp. <i>meridionalis</i>			
288.	<i>Isometroides vesicus</i>			
289.	14436 <i>Isopogon scabriusculus</i> subsp. <i>stenophyllus</i>			
290.	3993 <i>Isotropis drummondii</i> (Lamb Poison)			
291.	<i>Latrodectus hasseltii</i>			
292.	13284 <i>Lawrencella rosea</i>			
293.	1306 <i>Laxmannia paleacea</i>			
294.	7569 <i>Lechenaultia brevifolia</i>			
295.	3018 <i>Lepidium africanum</i> (Rubble Peppergrass)	Y		
296.	2352 <i>Leptomeria preissiana</i>			
297.	5848 <i>Leptospermum fastigiatum</i>			
298.	5855 <i>Leptospermum roei</i>			
299.	6401 <i>Leucopogon hamulosus</i>			
300.	20763 <i>Leucopogon</i> sp. Coolgardie (M. Hislop & F. Hort MH 3197)			
301.	7671 <i>Levenhookia leptantha</i> (Trumpet Stylewort)			
302.	25005 <i>Lialis burtonis</i>			
303.	25659 <i>Lichenostomus leucotis</i> (White-eared Honeyeater)			
304.	25661 <i>Lichmera indistincta</i> (Brown Honeyeater)			
305.	25415 <i>Limnodynastes dorsalis</i> (Western Banjo Frog)			
306.	<i>Lolium</i> sp.			
307.	1226 <i>Lomandra effusa</i> (Scented Matrush)			
308.	6967 <i>Lycium australe</i> (Australian Boxthorn)			
309.	<i>Lycosa dimota</i>			
310.	<i>Lycosa woonda</i>			
311.	2396 <i>Lysiana casuarinae</i>			

NatureMap is a collaborative project of the Department of Biodiversity, Conservation and Attractions and the Western Australian Museum.



Department of Biodiversity, Conservation and Attractions



Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
312.	2537 <i>Maireana brevifolia</i> (Small Leaf Bluebush)			
313.	2538 <i>Maireana carmosa</i> (Cottony Bluebush)			
314.	2544 <i>Maireana georgei</i> (Satiny Bluebush)			
315.	2550 <i>Maireana marginata</i>			
316.	2568 <i>Maireana trichoptera</i> (Downy Bluebush)			
317.	5866 <i>Malleostemon tuberculatus</i>			
318.	24551 <i>Malurus pulcherrimus</i> (Blue-breasted Fairy-wren)			
319.	25654 <i>Malurus splendens</i> (Splendid Fairy-wren)			
320.	24583 <i>Manorina flavigula</i> (Yellow-throated Miner)			
321.	19421 <i>Marianthus bicolor</i> (Painted Marianthus)			
322.	17633 <i>Marianthus erubescens</i>			
323.	<i>Masasteron compector</i>			
324.	4074 <i>Medicago laciniata</i> (Cutleaf Medic)	Y		
325.	15063 <i>Melaleuca acuminata</i> subsp. <i>acuminata</i>			
326.	15064 <i>Melaleuca acuminata</i> subsp. <i>websteri</i>			
327.	19380 <i>Melaleuca calyptroides</i>			
328.	5895 <i>Melaleuca conothamnoides</i>			
329.	5908 <i>Melaleuca eleuterostachya</i>			
330.	5916 <i>Melaleuca halmaturorum</i>			
331.	19486 <i>Melaleuca hamata</i>			
332.	5917 <i>Melaleuca hamulosa</i>			
333.	5925 <i>Melaleuca lateriflora</i> (Gorada)			
334.	5927 <i>Melaleuca laxiflora</i>			
335.	15663 <i>Melaleuca pauperiflora</i> subsp. <i>fastigiata</i>			
336.	25663 <i>Melithreptus brevirostris</i> (Brown-headed Honeyeater)			
337.	24736 <i>Melopsittacus undulatus</i> (Budgerigar)			
338.	24598 <i>Merops ornatus</i> (Rainbow Bee-eater)			
339.	2814 <i>Mesembryanthemum nodiflorum</i> (Slender Iceplant)	Y		
340.	<i>Metacyclops/Pescecyclus</i> sp.			
341.	18046 <i>Microcybe multiflora</i> subsp. <i>multiflora</i>			
342.	25693 <i>Microeca fascinans</i> (Jacky Winter)			
343.	9187 <i>Micromyrtus erichsenii</i>			
344.	5999 <i>Micromyrtus obovata</i>			
345.	6000 <i>Micromyrtus racemosa</i>			
346.	8105 <i>Millotia myosotidifolia</i>			
347.	12631 <i>Millotia perpusilla</i>			
348.	41991 <i>Mirbelia</i> sp. <i>Magentea</i> (T.E.H. Aplin 5976)			
349.	<i>Missulena occatoria</i>			
350.	24904 <i>Moloch horridus</i> (Thorny Devil)			
351.	29418 <i>Monoculus monstrosus</i>	Y		
352.	19587 <i>Monotaxis grandiflora</i> var. <i>obtusifolia</i>			
353.	25425 <i>Neobatrachus kunapalari</i> (Kunapalari Frog)			
354.	25426 <i>Neobatrachus pelobatoides</i> (Humming Frog)			
355.	24738 <i>Neophema elegans</i> (Elegant Parrot)			
356.	<i>Nicodamus mainae</i>			
357.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
358.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
359.	8136 <i>Oleania homolepis</i>			
360.	8140 <i>Oleania muelleri</i> (Goldfields Daisy)			
361.	24618 <i>Oreoica gutturalis</i> (Crested Bellbird)			
362.	34011 <i>Oreoica gutturalis</i> subsp. <i>gutturalis</i> (Crested Bellbird (southern))			
363.	46313 <i>Oriathera flaviflora</i>			
364.	25680 <i>Pachycephala rufiventris</i> (Rufous Whistler)			
365.	516 <i>Parapholis incurva</i> (Coast Bargrass)	Y		
366.	25681 <i>Pardalotus punctatus</i> (Spotted Pardalote)			
367.	25682 <i>Pardalotus striatus</i> (Striated Pardalote)			
368.	10975 <i>Paspalidium basicladum</i>			
369.	16735 <i>Patersonia drummondii</i> subsp. <i>drummondii</i>			
370.	40423 <i>Pentameris airoides</i> (False Hairgrass)	Y		
371.	15630 <i>Persoonia inconspicua</i>			
372.	2270 <i>Persoonia quinquenervis</i>			
373.	2274 <i>Persoonia saundersiana</i>			
374.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
375.	24659 <i>Petroica goodenovii</i> (Red-capped Robin)			
376.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
377.	4500 <i>Phebalium filifolium</i> (Slender Phebalium)			
378.	14883 <i>Phebalium laevigatum</i>			
379.	16556 <i>Phebalium megaphyllum</i>			
380.	4504 <i>Phebalium tuberculosum</i>			
381.	4142 <i>Phyllota luehmannii</i>			

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382.	5231 <i>Pimelea angustifolia</i> (Narrow-leaved Pimelea)			
383.	12104 <i>Pimelea spiculigera</i> var. <i>thesioides</i>			
384.	11910 <i>Pimelea suaveolens</i> subsp. <i>flava</i>			
385.	6812 <i>Pityrodia lepidota</i>			
386.	24748 <i>Platycercus varius</i> (Mulga Parrot)			
387.	14999 <i>Platysace trachymenioides</i>			
388.	32478 <i>Pleurodium nervosum</i> var. <i>nervosum</i>			
389.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
390.	8173 <i>Podolepis capillaris</i> (Wiry Podolepis)			
391.	8184 <i>Podotheca gnaphalioides</i> (Golden Long-heads)			
392.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
393.	25722 <i>Polytelis anthopeplus</i> (Regent Parrot)			
394.	24683 <i>Pomatostomus superciliosus</i> (White-browed Babbler)			
395.	16688 <i>Prasophyllum gracile</i>			
396.	1682 <i>Prasophyllum sargentii</i>			
397.	12120 <i>Prostanthera semiteres</i> subsp. <i>semiteres</i>			
398.	4725 <i>Psammomya choretroides</i>			
399.	36137 <i>Pseudocrossidium crinitum</i>			
400.	42416 <i>Pseudonaja mengdeni</i> (Western Brown Snake)			
401.	25263 <i>Pseudonaja modesta</i> (Ringed Brown Snake)			
402.	25433 <i>Pseudophryne guentheri</i> (Crawling Toadlet)			
403.	25434 <i>Pseudophryne occidentalis</i> (Western Toadlet)			
404.	28000 <i>Psora decipiens</i>			
405.	48670 <i>Pterostylis arbuscula</i>			
406.	1689 <i>Pterostylis mutica</i> (Midget Greenhood)			
407.	1696 <i>Pterostylis sargentii</i> (Frog Greenhood)			
408.	18657 <i>Pterostylis</i> sp. <i>inland</i> (A.C. Beaglehole 11880)			
409.	2707 <i>Ptilotus carlsonii</i>			
410.	2721 <i>Ptilotus exaltatus</i> (Tall Mulla Mulla)			
411.	2732 <i>Ptilotus holosericeus</i>			
412.	2733 <i>Ptilotus humilis</i>			
413.	2760 <i>Ptilotus spathulatus</i>			
414.	42344 <i>Purnella albifrons</i> (White-fronted Honeyeater)			
415.	25008 <i>Pygopus lepidopodus</i> (Common Scaly Foot)			
416.	24278 <i>Pyrrholaemus brunneus</i> (Redthroat)			
417.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
418.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
419.	13241 <i>Rhodanthe chlorocephala</i> subsp. <i>rosea</i>			
420.	13300 <i>Rhodanthe citrina</i>			
421.	13294 <i>Rhodanthe laevis</i>			
422.	13253 <i>Rhodanthe rubella</i>			
423.	44608 <i>Rosulabryum billardieri</i>			
424.	32426 <i>Rosulabryum campylothecium</i>			
425.	40425 <i>Rytidosperma caespitosum</i>			
426.	40427 <i>Rytidosperma setaceum</i>			
427.	7644 <i>Scaevola spinescens</i> (Currant Bush, Maroon)			
428.	32432 <i>Schizymenium bryoides</i>			
429.	8200 <i>Schoenia cassiniana</i> (Schoenia)			
430.	993 <i>Schoenus hexandrus</i>			
431.	2609 <i>Sclerolaena diacantha</i> (Grey Copperburr)			
432.	2610 <i>Sclerolaena drummondii</i>			
433.	2615 <i>Sclerolaena fusiformis</i>			
434.	2625 <i>Sclerolaena obliquicuspis</i> (Limestone Bindii)			
435.	25534 <i>Sericornis frontalis</i> (White-browed Scrubwren)			
436.	46824 <i>Seringia velutina</i> (Velvet firebush)			
437.	25266 <i>Simoselaps bertholdi</i> (Jan's Banded Snake)			
438.	3073 <i>Sisymbrium runcinatum</i>	Y		
439.	30948 <i>Smicromis brevirostris</i> (Weebill)			
440.	24108 <i>Sminthopsis crassicaudata</i> (Fat-tailed Dunnart)			
441.	7013 <i>Solanum hoplopetalum</i> (Thorny Solanum)			
442.	8900 <i>Spergularia marina</i>			
443.	19419 <i>Stenopetalum salicola</i>			
444.	<i>Storena formosa</i>			
445.	25597 <i>Strepera versicolor</i> (Grey Currawong)			
446.	24923 <i>Strophurus assimilis</i> (Goldfields Spiny-tailed Gecko)			
447.	7714 <i>Stylidium dielsianum</i> (Tangle Triggerplant)			
448.	34968 <i>Stylidium involucreatum</i>			
449.	1260 <i>Stypandra glauca</i> (Blind Grass)			
450.	32437 <i>Syntrichia antarctica</i>			
451.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
452.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
453.	24331 <i>Tadorna tadornoides</i> (Australian Shelduck, Mountain Duck)			
454.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			
455.	<i>Tamopsis mainae</i>			Y
456.	<i>Tanytarsus barbitarsis</i>			
457.	<i>Thereuopoda lesueurii</i>			
458.	6053 <i>Thryptomene cuspidata</i>			
459.	6058 <i>Thryptomene kochii</i>			
460.	1328 <i>Thysanotus dichotomus</i> (Branching Fringe Lily)			
461.	1338 <i>Thysanotus manglesianus</i> (Fringed Lily)			
462.	1343 <i>Thysanotus patersonii</i>			
463.	1348 <i>Thysanotus rectantherus</i>			
464.	1352 <i>Thysanotus speckii</i>			
465.	6268 <i>Trachymene cyanopetala</i>			
466.	4383 <i>Tribulus terrestris</i> (Caltrop)	Y		
467.	19174 <i>Triglochin</i> sp. A Flora of Australia (G.J. Keighery 2477)			
468.	4737 <i>Tripterooccus brunonis</i> (Winged Stackhousia)			
469.	4840 <i>Trymalium daphnifolium</i>			
470.	24983 <i>Underwoodisaurus milii</i> (Barking Gecko)			
471.	<i>Urodacus hoplurus</i>			
472.	<i>Urodacus novaehollandiae</i>			
473.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
474.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
475.	<i>Venator koyuga</i>			
476.	6114 <i>Verticordia rennieana</i>			
477.	8268 <i>Vittadinia humerata</i>			
478.	<i>Vulpia</i> sp.			
479.	13331 <i>Waitzia acuminata</i> var. <i>acuminata</i>			
480.	49079 <i>Weissia patula</i>			
481.	6938 <i>Westringia cephalantha</i>			
482.	9247 <i>Westringia rigida</i> (Stiff Westringia)			
483.	6659 <i>Wilsonia humilis</i> (Silky Wilsonia)			
484.	28172 <i>Xanthoparmelia reptans</i>			
485.	28189 <i>Xanthoparmelia willisii</i>			

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.