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Clearing Assessment Report – CPS 818

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Great Eastern Highway Upgrade
Package 8 (SLK 340.86 to 365.75)
Wheatbelt Region
EOS 2248

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1 PROPOSAL

1.1 Purpose and Justification

Main Roads proposes to upgrade a 23.5 km section of Great Eastern Highway (GEH) nominally between the towns of Moorine Rock and Southern Cross (Package 8), excluding a previously approved 1.3 km section near Parker Range Road.

GEH forms part of National Highway 94, and is a strategic freight, tourist and inter-town route. The efficiency and reliability of GEH is vital to the mining and agricultural sectors of the Wheatbelt and Goldfields regions.

Significant age and wear along sections of GEH is severely affecting the safety and efficiency of the highway. This route has been identified as the third riskiest road in regional WA for two consecutive RAC surveys, owing to the poor road condition. Of particular concern is the inadequate road formation and seal widths and the narrow or absent shoulders.

Between the towns of Merredin and Southern Cross, for the period 2018-2022, 39 crashes were recorded along GEH, resulting in one fatality, 23 major injuries and 12 hospital admissions or medical attention. This is a slight improvement from the period 2012-2016, where 47 crashes were recorded, resulting in two fatalities, 17 major injuries and 22 hospital admissions or medical attention.

The proposed upgrade will greatly improve road user safety by reducing the estimated Killed or Seriously Injured crash rate by more than 50%, as well as increase the efficiency of freight movements.

1.1.1 Main Roads Approach to Road Safety and the Environment

Main Roads is committed to minimising the environmental impacts of all of its activities and manages the State road network to achieve balanced economic, social, safety and environmental benefits for the community. Main Roads recognises that Western Australia's environment is significant from a global perspective and the unique conservation values that are contained within its road reserve. Main Roads road network often adjoins natural areas and, in some locations, the reserve itself hosts remnant vegetation with high environmental values. Although the reserves were not established for this purpose, Main Roads recognises that it has a responsibility to conserve the environmental values that occur within the State's road network and minimise the impact its proposals have on the environment. In addition to providing a safe and efficient road network for all people using the roads under its control, Main Roads is also committed to protecting and enhancing the natural environment.

In accordance with National and State Government road safety policies, Main Roads is also committed to substantially reducing road trauma on the road network through Safe System principles. The Safe System approach acknowledges that more than two thirds of all serious crashes are due to human error rather than deliberate risk taking (e.g. speeding or drink driving) and seeks to improve behaviour through education and enforcement while managing the safety of vehicles, speeds and the road and road infrastructure. It is shown that improving sub-optimal road formation will substantially reduce the likelihood and severity of road crashes. For example, according to the Road Safety Management Guideline, increasing the sealed shoulder from 0.5 m to 2 m will reduce Killed and Seriously Injured numbers by more than 50%.

As the statutory authority responsible for providing and managing a safe and efficient main road network in Western Australia, Main Roads focuses on improving road safety by thoroughly considering all environmental, economic and community benefits and impacts. It operates on a hierarchy of avoiding, minimising, reducing and then, if required, offsetting our environmental

impacts. This has been achieved through changes in proposal scope and design. Main Roads regularly reduces its clearing footprint by restricting earthworks limits for proposals, steepening batters, installing barriers, establishing borrow pits in cleared paddocks and avoiding temporary clearing for storage, stockpiles and turn around bays to avoid and minimise its impacts.

Further details on measures to avoid, minimise and reduce are provided in Section 1.5.

1.2 Proposal Scope

Main Roads proposes to upgrade a 23.5 km section of GEH between the towns of Moorine Rock and Southern Cross (Package 8). The upgrade will comprise the following components:

- Overlay and widening to achieve 11 m seal on an 11 m wide formation;
- Improvements to Moorine Rock townsite;
- Intersection improvements with local roads including Granich Road, Moorine Rock Road, Beaton Road, Garratt Road (north and south), Threeboys Road and Southern Cross Road;
- Upgrades to drainage infrastructure;
- New rest area.

1.3 Proposal Location

The Proposal area is located along the Great Eastern Highway (H005) between SLK 340.86 and 365.75, between Moorine Rock and Southern Cross, in the Shire of Yilgarn as shown in Figure 1. The Proposal area excludes an area near Parker Range Road (SLK 343 to SLK 344.33) as this section has been previously assessed/approved.

The coordinates of the Proposal area are:

MGA reference: GDA 2020 MGA Z50

Western extent: 119.087912 -31.313865

Eastern extent: 119.332308 -31.235580

The 20 km study area is shown in Figure 2.

1.4 Clearing Details

Proposed Clearing to be undertaken using CPS 818: Up to 13.33 ha in a 73.47 ha Proposal area.
Approved Clearing Area Shapefile: D23#1292123.

Areas of Native Vegetation Clearing:

The areas of native vegetation to be cleared are shown in Figure 3.

Type of Native Vegetation:

The type of vegetation to be cleared under this Proposal comprises of various Eucalypt woodland vegetation types, with a mix of *Melaleuca*, *Acacia* and *Tecticornia* shrublands as shown in Figure 3 (and Appendix 2).

Figure 1. Proposal area

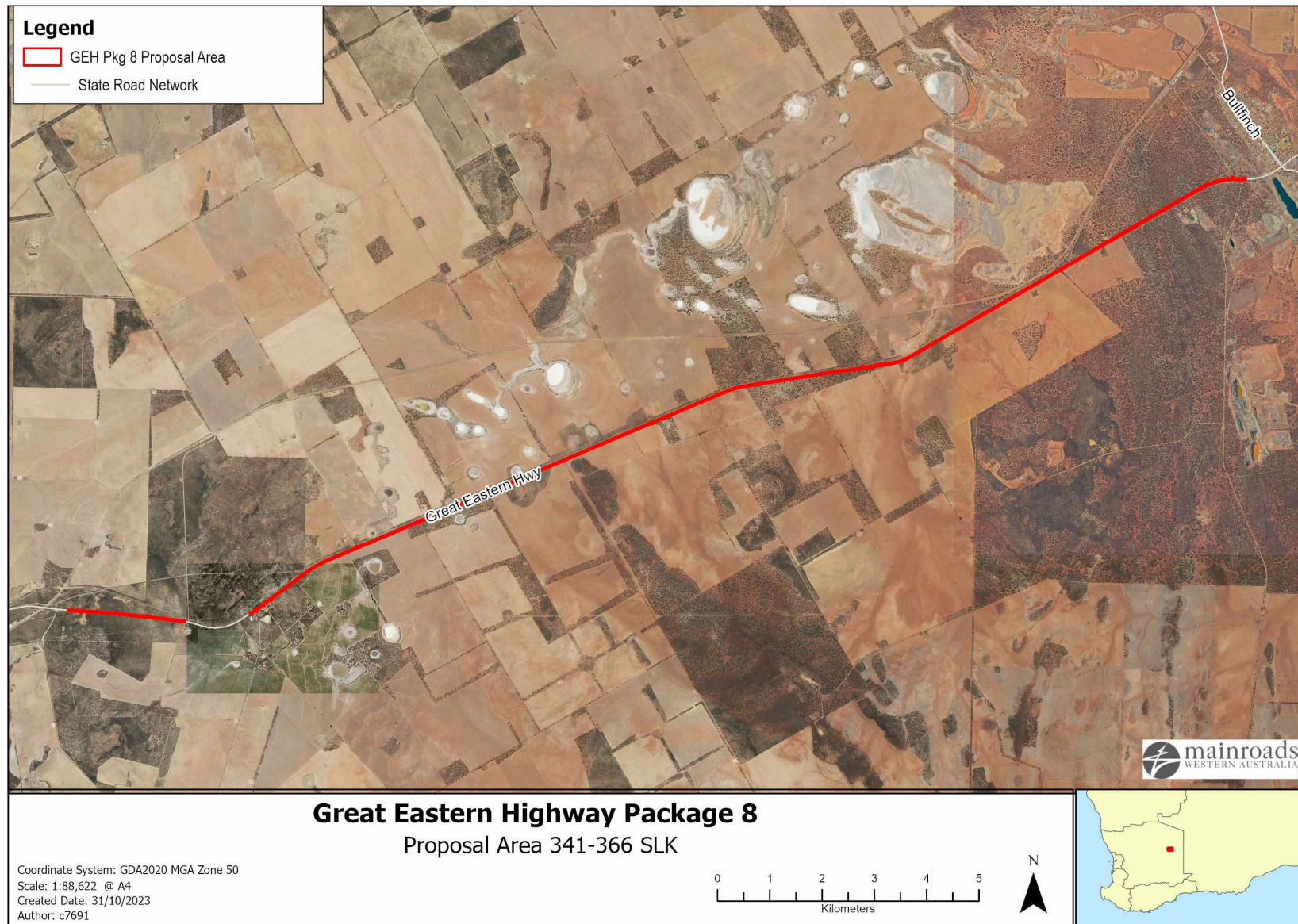
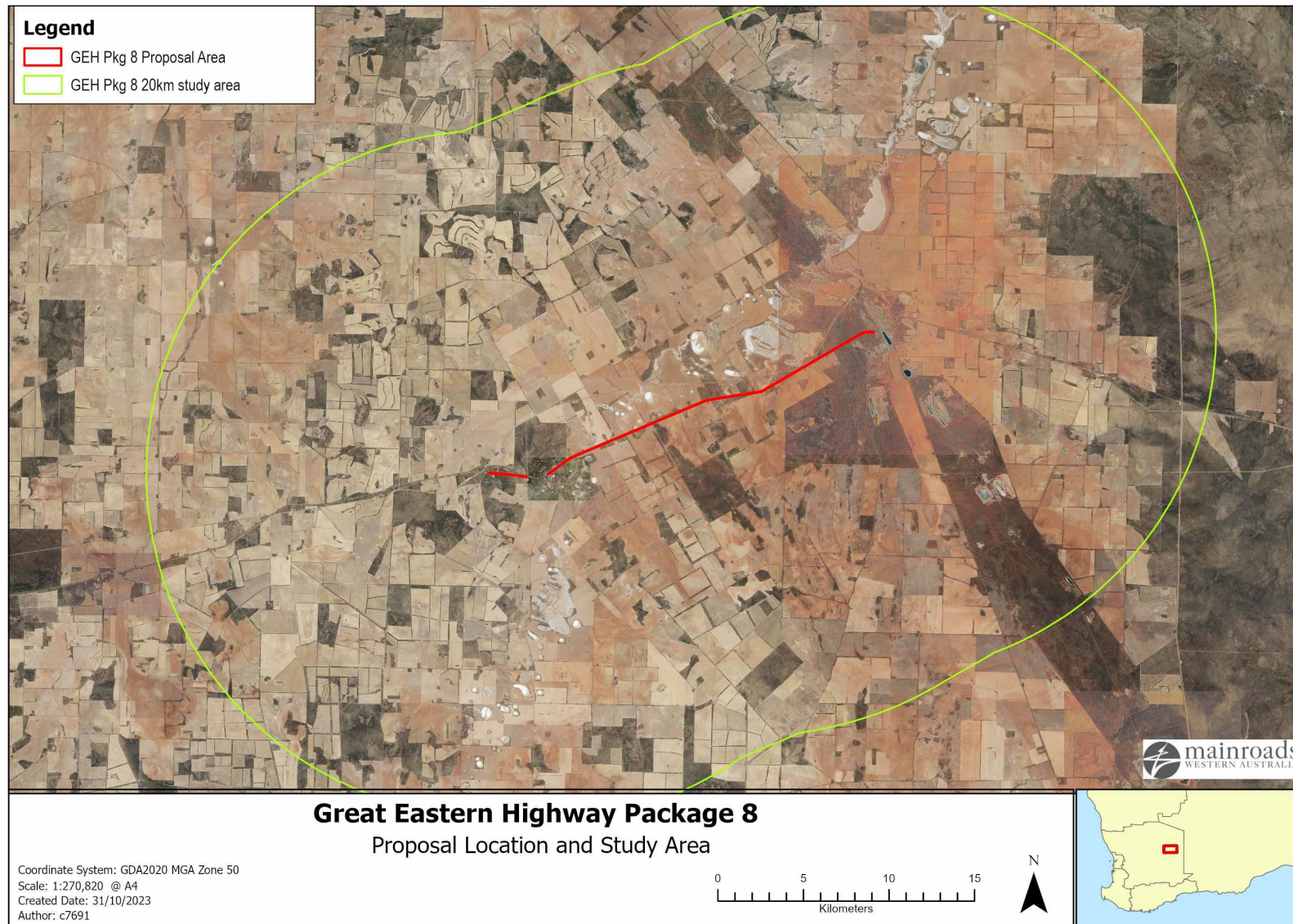


Figure 2. Study area



[illegible]

1.5 Alternatives to Native Vegetation Clearing Considered During Proposal Development

The following alternatives to clearing were considered during the development of the proposal:

- Preferentially locating the new alignment in cleared pasture areas over the existing road reserve, however this was considered cost prohibitive e.g. due to cost of resumption of farmland and construction of completely new road rather than widening in existing alignment and premature redundancy of State road asset, lack of adequate funding, stakeholder engagement, resource requirements. Under this option, clearing would still be required for tie-ins to the existing road network.
- Upgrading other alternative routes that are less vegetated and environmentally constrained, however these are not suitable due to longer travel times, sensitive local receptors (such as residences) or other planning issues.
- Do not upgrade the road, however this will potentially result in a poorer safety outcome and may result in future fatalities or serious injuries and further degradation of the State road asset.
- Main Roads retains frangible vegetation where a clear zone is to be established for road projects. For this project, however, clearing will only be required to accommodate the road formation, with no clear zone being established. Accordingly, the retention of frangible vegetation does not apply to this Proposal.
- Reducing the speed limit to minimise clearing requirements, while still balancing safety (driver fatigue) and freight efficiency. Speed Limits are an essential mechanism to ensure the safe and efficient operation of road networks. The application of appropriate speed limits and other traffic management measures is a key mechanism in managing vehicle speeds to achieve desired safety, mobility, traffic management, local amenity, and road user expectations. There are several factors involved in road safety, including road conditions, driver behaviour and overall road design. Except in special situations, reducing speed limits below national standards on state and national roads is not typically supported as it has the potential to contribute to driver frustration, impatience, tiredness and recklessness. The environmental values protected by reducing the speed limit, do not justify the impacts on freight efficiencies nor road user safety. Accordingly, the reduction of the speed limits to avoid clearing of native vegetation for this proposal is not proposed.

1.6 Measures to Avoid, Minimise, Reduce and Manage Proposal Clearing Impacts

The design and management measures implemented to avoid and minimise the potential clearing impacts of the Proposal are provided in Table 1.

Table 1. Measures Undertaken to Avoid, Minimise, Reduce and Manage the Proposal Clearing Impacts

Design or Management Measure	Discussion and Justification
Alignment to one side of existing road	The upgrade and widening of the GEH has been aligned to mostly impact on vegetation on the north (LHS) of the existing road formation, thereby keeping most of the impact on this side, and maintaining the south side at its existing grade in efforts to mitigate vegetation clearing.
Alternative alignment located within pasture or degraded areas	The scope of works is to upgrade the GEH along its existing alignment. Realignment would likely result in a greater amount of clearing.
Simplification of design to reduce number of lanes and/or complexity of intersections	The upgrade of this section of the GEH will utilise the existing cleared zone as far as practical, with only minor clearing required to widen the GEH to the full design extent.
Steepen batter slopes	Due to the traffic volumes, vehicle types and posted speeds these batters cannot be changed significantly. Further, the existing terrain correlates to the potential batter slope without changing the shape of the batter.
Installation of barriers	The installation of safety barriers would not reduce the clearing required due to the requirements of roadside drainage.
Installation of kerbing	Kerbing does not apply for this section of road, as it becomes a hazard to road users due to existing level differences.
Use of existing cleared areas for access tracks, construction storage and stockpiling	Access tracks will not be required. Half width construction methodology will be followed, and traffic will be managed through the existing GEH road alignment. Construction storage and stockpiling will be restricted to existing cleared or highly disturbed areas.
Drainage modification	Drainage has been considered and mostly not changed on the south side of the road to minimise the Proposal footprint.

1.7 Approved Policies and Planning Instruments

The clearing of native vegetation in Western Australia is regulated under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations).

In addition to the matters considered in accordance with section 51O of the EP Act, Main Roads has also had regard to the below instruments where relevant.

Other Legislation potentially relevant for assessment of clearing and planning/other matters:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Conservation and Land Management Act 1984* (WA) (CALM Act)
- *Country Areas Water Supply Act 1947* (WA) (CAWS Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Planning and Development Act 2005* (WA) (P&D Act)
- *Soil and Land Conservation Act 1945* (WA)
- *Rights in Water and Irrigation Act 1914* (WA)
- *Aboriginal Heritage Act 1972* (WA).

Environmental Protection Policies:

- Environmental Protection (Peel Inlet - Harvey Estuary) Policy 1992
- Environmental Protection (Western Swamp Tortoise Habitat) Policy 2011.

Other relevant policies and guidance documents:

- Environmental Offsets Policy (Government of Western Australia, 2011)
- A guide to the assessment of applications to clear native vegetation (Government of WA, December 2014)
- Procedure: Native vegetation clearing permits (Government of WA, October 2021)
- Environmental Offsets Guidelines (Government of Western Australia, 2014)
- Technical guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016)
- Technical guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA, 2020)
- Approved conservation advice under section 266B of the EPBC Act for threatened flora/fauna/vegetation communities.

2 SCOPE AND METHODOLOGY ASSESSMENT OF CLEARING

Native vegetation will be cleared to accommodate this Proposal. This clearing will be undertaken using the Main Roads Statewide Clearing Permit CPS 818.

To comply with CPS 818, Main Roads must prepare a Clearing Assessment Report (CAR).

The CAR outlines the key activities associated with the Proposal, the existing environment and an assessment of native vegetation clearing. This assessment provides an evaluation of the vegetation clearing impacts associated with the Proposal using the ten Clearing Principles listed under s51 of the *Environmental Protection Act 1986* (EP Act) and strategies used to manage vegetation clearing.

2.1 Report Terminology and Sources

The following terms are used in this Clearing Report:

- **Native Vegetation Clearing Area** – The maximum amount of native vegetation to be cleared for the Proposal that will accommodate the designed earthworks and, typically, a nominal buffer to allow for the safe movement of machinery during construction.
- **Proposal Area** – The total footprint of the Proposal including both cleared and uncleared areas. This is based on the current design and is less than the development envelope. It usually includes a buffer to allow for constructability and the movement of machinery during construction.
- **Study Area** – Area covered by the Desktop Assessment. The Study Area for the Proposal is confined to a local area of a 20km radius.
- **Survey Area** – Area covered by the Biological Survey, which is typically larger than the Proposal area.

2.2 Desktop Assessment

A desktop assessment of the Proposal area was undertaken by viewing internal datasets and other government agency managed databases, and consulting with relevant stakeholders where necessary.

GIS layer viewing and mapping is done using ArcMap and/or Main Roads corporate mapping system known as iMaps. Referencing of the GIS layers accessed is done under the relevant methodology section of each clearing principle. Government managed databases were searched to locate additional information, which are found under References in Section 9.

2.3 Surveys and Assessments

The following surveys/assessments were undertaken to inform this CAR:

- GHD (2016) Great Eastern Highway, Merredin to Southern Cross SLK 258.5–365.5 Biological Assessment,
- Astron (2018) Great Eastern Highway, Merredin to Southern Cross SLK 258.5 – 365.5 Biological Assessment,
- Ecologia (2019) Great Eastern Highway 327– 365.8 SLK, Desktop Assessment,
- Ecologia (2020) Great Eastern Highway, Walgoolan to Southern Cross, Package 6 to 8: SLK 327 to 365.8, Targeted Flora Survey,
- Ecologia (2023) Walgoolan – Southern Cross Package 8 Great Eastern Highway (H005) Biological Survey.

Biological and targeted surveys conducted for the Proposal are outlined in Table 2 and a summary of the findings in these reports are presented in Sections 3.1 to 3.2.

Table 2. Summary of Biological and Targeted Surveys Relevant to the Proposal

Consultant & Survey Name	Survey Details
GHD (2016) <i>Great Eastern Highway – Merredin to Southern Cross SLK 258.5–365.5 Biological Assessment</i>	Survey Area: Survey area comprised approximately 1,399 ha adjacent to GEH between the towns of Merredin and Southern Cross (SLK 258.5 to 365.5, on average 60 m wide). Type: Reconnaissance vegetation, flora and fauna survey. The survey identified and mapped the dominant vegetation units and fauna habitat types, assessed vegetation condition and completed opportunistic searches for conservation significant ecological communities and flora and fauna taxa. Timing: Fieldwork conducted from 7-12 October 2015. Targeted conservation significant flora survey was conducted on 20 January 2016. Survey Results Shapefile TRIM Ref: D21#147901 Document TRIM Reference: D21#147870
Astron (2018) <i>Great Eastern Highway – Merredin to Southern Cross SLK 258.5 – 365.5 Biological Assessment</i>	Survey Area: Survey area comprised approximately 1,418 ha adjacent to GEH between the towns of Merredin and Southern Cross (SLK 258.5 to 365.5) Type: Biological assessment and the resurvey of areas inferred as Eucalypt woodlands of the Western Australian Wheatbelt TEC in the GHD (2016) biological assessment. Timing: Fieldwork conducted 25-30 September 2018 Survey Results Shapefile TRIM Ref: D21#147732 Document TRIM Ref: D21#147725
Ecologia (2019) <i>Great Eastern Highway 327–365.8 SLK Desktop Assessment</i>	Survey Area: Survey area comprised approximately 512 ha located along a 38.8 km section of GEH (includes Package 8) between Walgoolan and Southern Cross (SLK 327–365.8). Type: Supplementary desktop assessment to determine the likelihood of occurrence of any Threatened and Priority flora. Timing: October 2019. Document TRIM Ref: D21#292478
Ecologia (2020) <i>Great Eastern Highway Walgoolan to Southern Cross: Packages 6 to 8: SLK 327 to 365.8 Targeted Flora Survey</i>	Survey Area: Survey Area comprised of a 38.8 km section of GEH (includes Package 8) between Walgoolan and Southern Cross (SLK 327–365.8) with 'Good' or better condition vegetation that were inside, or adjacent to the previous GHD survey area. Type: Targeted survey for Threatened and Priority listed flora identified as likely or potentially occurring in the Development Envelope. Areas of habitat within the survey area that had been assessed by GHD (2016) to be in 'Good' or better condition that were inside, or adjacent to the survey area were searched as part of this study. Timing: Fieldwork was conducted 26-27 September 2019. Survey Results Shapefile TRIM Ref: D23#1132366 Document TRIM Ref: D21#292491

Consultant & Survey Name	Survey Details
Ecologia (2023) <i>Walgoolan – Southern Cross Package 8 Great Eastern Highway (H005) Biological Survey</i>	Survey Area: Survey Area comprises 95 ha on GEH between SLK 340.86 to 365.75. Type: Desktop assessment, a detailed flora and vegetation survey, a basic fauna and fauna habitat assessment, and a black cockatoo assessment. Timing: Fieldwork was conducted 9-13 November 2022. Survey Results Shapefile TRIM Ref: D23#237285 Document TRIM Ref: D23#673348

3 SURVEY RESULTS

In accordance with CPS 818/17 condition 8 (e) (iii), a copy of the relevant sections of the executive summary and report conclusions from the biological survey and/or field assessments are provided in [Appendix 1](#).

3.1 Summary of Flora and Vegetation Surveys

Vegetation

Ecologia (2023) mapped ten native vegetation units within the Proposal area, as shown in Table 3.

Table 3. Vegetation Units within the Proposal area

Vegetation Unit	Area (ha)	% of Proposal area	Condition
<i>Melaleuca</i> spp. and <i>Acacia</i> spp. Tall shrubland	1.25	1.7	Excellent to Very Good
<i>Eucalyptus</i> spp. Mallee woodland	0.04	0.05	Very Good
<i>Eucalyptus salubris</i> open forest	0.15	0.2	Very Good
<i>Borya sphaerocephala</i> herbland	0.03	0.04	Excellent
<i>Eucalyptus longicornis</i> woodland	4.05	5.5	Excellent to Very Good
<i>Eucalyptus capillosa</i> mid woodland	1.76	2.4	Very Good to Degraded
<i>Eucalyptus burracoppinensis</i> mid mallee open woodland	1.72	2.4	Excellent
<i>Tecticornia</i> chenopod shrubland	0.39	0.5	Degraded
<i>Eucalyptus myriadena</i> open forest	3.88	5.3	Very Good to Good
Scattered native species	0.04	0.05	Degraded
Total	13.33		

Ecological communities

Ecologia (2023) did not observe any plant communities that corresponded to any state (BC Act) or Commonwealth (EPBC Act) listed Threatened Ecological Community (TEC), or any state listed Priority Ecological Community (PEC) within mapped native vegetation.

Significant flora

GHD (2016) and Ecologia (2023) did not record any EPBC Act or BC Act listed Threatened species or DBCA listed Priority species within the targeted survey area, nor were any significant species recorded within the remainder of the wider Package 8 survey area.

One flora species recorded in the Proposal area at SLK 345.18 (RHS) is a Declared Pest and Weed of National Significance (Prickly Pear - *Opuntia* sp.).

3.2 Summary of Fauna Surveys

Fauna habitats

Ecologia (2023) mapped two fauna habitat types in the Clearing area, as shown in Table 4.

Table 4. Fauna habitat within Clearing area

Habitat	Area (ha)	% of Clearing area
Woodland (Open) - Mixed Eucalyptus sp. (<i>E. longicornis</i> , <i>E. loxophleba</i> , <i>E. salubris</i> , <i>E. capillosa</i> , <i>E. myriadena</i>) woodlands	11.64	87.3
Shrubland (Open) - Scattered Eucalypts over an open shrubland of <i>Acacia</i> sp., <i>Melaleuca</i> sp. and <i>Eremophila</i> sp.	1.69	12.7
Total	13.33	100

Rubbish and tracks from human impacts contributed to lower condition ratings of 'Good' while some areas were considered to be in 'Excellent' condition.

Significant fauna

GHD (2016) reported that desktop searches identified the presence/potential presence of 18 significant fauna taxa within the 107 km survey area. Of these, four species may be present based on the habitats available:

- Carnaby's Black Cockatoo (*Calyptrorhynchus latirostris* – Endangered)
- Malleefowl (*Leipoa ocellata* – Vulnerable)
- Chuditch (*Dasyurus geoffroii* – Vulnerable)
- Shield-backed trapdoor spider (*Idiosoma nigrum* – Endangered)

Ecologia (2023) reported that desktop searches identified the presence/potential presence of eight significant fauna taxa within the Package 8 survey area. Ecologia only considered species recorded by DBCA within the 20km study area, and did not consider EPBC marine or migratory species, as there was not suitable habitat within the survey area for these species.

Of these, only Malleefowl (*Leipoa ocellata*) was considered likely to occur due to the species recorded as roadkill by GHD during a previous survey and multiple records less than 50m from the survey area. Although no evidence of the species (primary sighting or mounds) was recorded during the Ecologia (2023) survey, based on the recency and proximity of records and presence of suitable Open Woodland habitat, this species is considered likely to utilise habitat within the Proposal area during dispersal and foraging activities. There is 11.64 ha of suitable habitat for Malleefowl within the Native Vegetation Clearing Area.

Although Ecologia (2023) conducted targeted searches for the Tree-stem Trapdoor Spider, no spider burrows belonging to this species or any other trapdoor spider taxa were recorded.

Black Cockatoo Habitat Assessment

Of the 20 diameter at breast height (DBH) trees Ecologia (2023) mapped in the survey area, 18 supported no visible hollows and two trees supported a single, unsuitable hollow each. Of these, six occur in the Native Vegetation Clearing Area, with one tree containing a hollow.

The north-west corner of the 20km study area falls within the DAWE (2022) modelled distribution of the Carnaby's Black cockatoo species; however, the modelled distribution does not intersect the wider survey area. DBCA database searches indicate that there are no records of the species within the study area or survey area. An assessment was undertaken to investigate potential breeding habitat, night roosting habitat, and foraging habitat for this species within the survey area. No primary or secondary evidence of black cockatoos was recorded during the current or previous fauna surveys.

4 VEGETATION DETAILS

4.1 Proposal Site Vegetation Description

Table 5 and Table 7 provide details of the vegetation types and their condition within the Proposal and the remaining extents of these associations.

For a full description of the existing vegetation, refer to the Biological Reports referenced in Table 2.

Table 5. Summary of Project Area's Mapped Pre-European Vegetation Associations

Pre-European Vegetation Association	Clearing Description	Vegetation Condition	Comments
Vegetation Association 8 described as Medium woodland; salmon gum and gimlet	Clearing of up to 2.07 ha of native vegetation for the purposes of road widening and upgrade on Great Eastern Highway	Excellent to Degraded	Vegetation description and condition determined from biological survey (Ecologia, 2023)
Vegetation Association 1068 described as Medium woodland; salmon gum, morel, gimlet and <i>Eucalyptus sheathiana</i>	Clearing of up to 8.35 ha of native vegetation for the purposes of road widening and upgrade on Great Eastern Highway		
Vegetation Association 1413 described as Shrublands; <i>Acacia</i> , <i>Casuarina</i> and <i>Melaleuca</i> thicket	Clearing of up to 2.91 ha of native vegetation for the purposes of road widening and intersection upgrade on Great Eastern Highway and Parker Range Road		

Based on the above table, this equates to 13.33 ha of native vegetation within a 73.47 ha Proposal area.

The Proposal area is located in two mapped IBRA Bioregions and Sub- regions as shown in Table 6.

Table 6. Vegetation Association per IBRA Region/Sub-region

SLK Range	IBRA Bioregion	IBRA Sub-region	Vegetation Associations
340.86 – 351.35	Avon Wheatbelt	Merredin	8 and 1413
351.35 – 365.75	Coolgardie	Southern Cross	1068

Table 7. Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale:	Pre-European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Veg Assoc No. 8	Statewide	694,638	346,425	49.87	6.77
	IBRA Bioregion Avon Wheatbelt	356,571	50,340	14.12	1.22
	IBRA Sub-region Merredin	353,871	49,941	14.11	1.23
	Local Government Authority Shire of Yilgarn	163,920	59,992	36.60	6.51

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Veg Assoc No. 1068	Statewide	268,900	142,088	52.84	6.23
	IBRA Bioregion Coolgardie	193,988	104,804	54.03	13.15
	IBRA Sub-region Southern Cross	193,988	104,804	54.03	13.51
	Local Government Authority Shire of Yilgarn	268,900	142,088	52.84	6.23
Veg Assoc No. 1413	Statewide	1,679,916	1,286,855	76.60	13.22
	IBRA Bioregion Avon Wheatbelt	546,675	174,102	31.85	2.33
	IBRA Sub-region Merredin	546,676	174,102	31.85	2.33
	Local Government Authority Shire of Yilgarn	538,791	395,458	73.40	19.26

5 ASSESSMENT AGAINST THE TEN CLEARING PRINCIPLES

In assessing whether the Proposal's proposed clearing is likely to have a significant impact on the environment, the Proposal was assessed against the ten Clearing Principles (EP Act, Schedule 5).

Each principle has been assessed in accordance with the former Department of Environment Regulation (now Department of Water and Environmental Regulation (DWER) '[A Guide to the Assessment of Applications to Clear Native Vegetation](#)' (Department of Environment Regulation, 2014) and other relevant clearing permit application decision reports prepared by DWER.

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

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

Proposed clearing is not likely to be at variance to this Principle.

The proposed clearing will result in the removal of up to 13.33 ha of native vegetation along Great Eastern Highway, primarily on the southern side of the road. Condition of the vegetation ranges from Excellent to Degraded. The Proposal area comprises the following 10 vegetation types, which are considered typical of the local area:

Vegetation Unit descriptor	Vegetation Unit description
02	<i>Melaleuca</i> spp. and <i>Acacia</i> spp. Tall shrubland
09	<i>Eucalyptus</i> spp. Mallee woodland
10	<i>Eucalyptus salubris</i> open forest
11	<i>Borya sphaerocephala</i> herbland
17	<i>Eucalyptus longicornis</i> woodland
E1	<i>Eucalyptus capillosa</i> mid woodland
E2	<i>Eucalyptus burracoppinensis</i> mid mallee open woodland
E3	<i>Tecticornia</i> chenopod shrubland
R5	<i>Eucalyptus myriadena</i> open forest

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SN	Scattered native species
Database searches by Ecologia (2023) indicated that 28 Threatened and Priority Flora Species have been recorded or may be likely to occur within 20km of the survey area. Ten flora species were considered to have a high likelihood of occurrence and eight having a Moderate likelihood of occurrence, prior to the field survey.	
A field survey undertaken in September 2022 (Ecologia, 2023) identified 195 vascular flora species within the survey area. 22 introduced species were recorded, of which one (<i>Opuntia</i> sp.), is listed as a Declared Pest and Weeds of National Significance (WONS) and was recorded from a single location. The location of the Declared Pest species is within the Proposal area and will be controlled prior to any clearing works.	
None of the flora species identified were Threatened or Priority Species. Furthermore, the post-survey assessment considered that all conservation significant species were considered to have a Low likelihood of occurrence within the project area (Ecologia, 2023).	
None of the vegetation types described by Ecologia (2023) within the Proposal area are representative of communities that correspond to any state (BC Act) or Commonwealth (EPBC Act) listed Threatened Ecological Community (TEC) or any state listed Priority Ecological Community (PEC).	
The proposed clearing area comprises two fauna habitat types: • Open Eucalypt woodland • Open Eucalypt shrubland	
Thirty-five vertebrate fauna species were recorded during the survey including two mammals (one introduced), 29 birds and four reptiles. Fauna recorded during the survey were generally common and are not restricted to the survey area. No significant vertebrate fauna was recorded during the survey.	
Database searches identified three birds (Malleefowl, Peregrine Falcon, Common Greenshank) and one mammal (Chuditch) within the 20 km study area, none of which were recorded during the current survey. Of these, only Malleefowl (<i>Leipoa ocellata</i>) was considered likely to occur due to the species recorded as roadkill by GHD (2016) during a previous survey and multiple records less than 50m from the survey area. Benshemesh (2007) reports that Malleefowl have a home range of over one to several square kilometres and utilise corridors of relatively thick vegetation when dispersing through open landscapes. The removal of a narrow, linear strip of vegetation along the road is unlikely to significantly impact on the dispersal and foraging activities for this species.	
The clearing of 11.64 ha of Open Woodland habitat adjacent to the road that does not contain any Malleefowl mounds is unlikely to significantly impact on this species.	
Ecologia (2023) conducted targeted searches for the Tree-stem Trapdoor Spider, no spider burrows belonging to this species or any other trapdoor spider taxa were recorded.	
Database searches also identified three Priority invertebrate species within the 20km study area, being the Tree-stem Trapdoor Spider (<i>Aganippe castellum</i>), Brine Shrimp (Wheatbelt) (<i>Paratemia contracta</i>) and the Water Flea (inland southwest) (<i>Daphnia jollyi</i>). Ecologia (2023) conducted targeted searches for the Tree-stem Trapdoor Spider, no spider burrows belonging to this species or any other trapdoor spider taxa were recorded. No suitable habitat for Brine Shrimp or Water Flea was present within the survey area.	
The native vegetation proposed to be cleared for the Proposal is not considered to provide a high level of biological diversity with no significant flora and fauna species likely to be significantly impacted. The clearing adjacent to the existing roadway will not significantly impact on ecological linkages within the local area.	
Based on the above, the proposed clearing is not likely to be at variance to this Principle.	

Methodology

- Biological Survey (Ecologia, 2023)
- DCCEEW Protected Matters Search Tool Report
- Department of Natural Resources and Environment (2002)
- Government GIS Shapefiles:
 - DBCA Threatened Fauna database search (Accessed 21-Nov-2023)
 - DBCA Threatened and Priority flora database search (Accessed 21-Nov-2023)

(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.

Proposed clearing is not likely to be at variance to this Principle.Fauna habitats

Two fauna habitat types have been mapped within the Proposal area, including:

- Open Eucalypt woodland (11.64 ha)
- Open Eucalypt shrubland (1.69 ha)

Significant fauna

A search of ArcGIS DBCA Threatened Fauna layer identified the presence/potential presence of eight conservation significant fauna taxa within the study area, namely:

- Brine shrimp (*Parartemia contracta*)
- Water flea (*Daphnia jollyi*)
- Chuditch (*Dasyurus geoffroi*)
- Common Greenshank (*Tringa nebularia*)
- Malleefowl *Leipoa ocellata*
- Peregrine Falcon (*Falco peregrinus*)
- Tree-stem Trapdoor Spider (*Aganippe castellum*) and
- Western Brush Wallaby (*Notamacropus irma*)

Ecologia (2023) reported that desktop searches identified the presence/potential presence of eight significant fauna taxa within the Package 8 survey area. Ecologia only considered species recorded by DBCA within the 20km study area, and did not consider EPBC marine or migratory species, as there was not suitable habitat within the survey area for these species.

Of these, only Malleefowl (*Leipoa ocellata*) was considered likely to occur due to the species recorded as roadkill by GHD (2016) during a previous survey and multiple records less than 50m from the survey area. Although no evidence of the species (primary sighting or mounds) was recorded during the Ecologia (2023) survey, based on the recency and proximity of records and presence of suitable Open Woodland habitat, this species is considered likely to utilise habitat within the Proposal area during dispersal and foraging activities. There is 11.64 ha of suitable native habitat for Malleefowl within the Proposal area.

According to the National Recovery Plan for Malleefowl (Benshemesh, 2007), habitat critical for survival is broadly described as semi-arid to arid zone shrublands and low woodlands dominated by mallee. More specifically to Western Australia, Malleefowl are found in some shrublands dominated by acacia, and occasionally in woodlands dominated by eucalypts such as Wandoo *E. wandoo*, Marri *Corymbia calophylla* and Mallet *E. astringens* (Benshemesh, 2007).

Parsons (2008) examined the distribution of Malleefowl within the Western Australian Wheatbelt and noted the species was associated with landscapes that had lower rainfall, greater amounts of mallee and shrubland that occur as large remnants, and lighter soil surface textures. At a finer scale, Malleefowl occurrence was associated with mallee/shrubland and thicket vegetation with woodland representing poor habitat for the species (cited in Benshemesh, 2007).

Based on the above, the clearing of 11.64 ha of narrow, linear Open Woodland habitat adjacent to the road that does not contain any Malleefowl mounds is unlikely to represent significant Malleefowl habitat.

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Although Ecologia (2023) conducted targeted searches for the Tree-stem Trapdoor Spider, no spider burrows belonging to this species or any other trapdoor spider taxa were recorded.

The Proposal area is not located within the modelled range of any black cockatoo species (Ecologia, 2023). According to the EPA (2019), the Proposal area falls within the former distribution (pre-1987) of the Carnaby's Cockatoo. Expert advice received by Main Roads in 2020 (Johnstone, per.com) also supports EPA (2019), advising that the Carnaby's Cockatoo breeding range is now restricted to the west of Kellerberrin (approximately 150km west of the Proposal area). Accordingly, no Carnaby Cockatoo foraging, roosting and breeding is likely to occur within the Proposal area.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

- Benshemesh (2007)
- Biological Survey (Ecologia, 2023)
- Biological Survey (GHD, 2016)
- DCCEEW Protected Matters Search Tool Report
- EPA (2019)
- Johnstone (2020)
- Government GIS Shapefiles:
 - DBCA Threatened and Priority fauna database search (Accessed 09-Nov-2023)

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

Proposed clearing is not at variance to this Principle.

A search of ArcGIS DBCA Herbarium and Threatened/Priority layers identified the presence/potential presence of 40 conservation significant flora taxa within the study area. No Threatened or Priority flora were identified within the Proposal area by GHD (2016) or Ecologia (2023). Furthermore, following field the survey, Ecologia considered all conservation significant species identified in their desktop assessment as unlikely to occur within the wider survey area.

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology

- Biological Survey (Ecologia, 2023)
- Biological Survey (GHD, 2016)
- Government GIS shapefiles:
 - DBCA Threatened flora database search (Accessed 09-Nov-2023)
 - DBCA Herbarium database search (Accessed 09-Nov-2023)

(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.

Proposed clearing is not at variance to this Principle.

Ecologia (2023) did not record any Threatened Ecological Communities (TECs) in native vegetation within the Proposal area.

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology

- Biological Survey (Ecologia, 2023)

(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.

Proposed clearing is not likely to be at variance to this Principle.

The National Objectives and Targets for Biodiversity Conservation recognise that the retention of 30% 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) except in constrained areas (Perth & Peel) where 10% representation should be maintained.

Three Vegetation Associations (VA) of Beard (1976) have been mapped over the Proposal area, namely:

- VA 8 described as Medium woodland; salmon gum and gimlet
- VA 1068 described as Medium woodland; salmon gum, morel, gimlet and *Eucalyptus sheathiana*
- VA 1413 described as Shrublands; *Acacia*, *Casuarina* and *Melaleuca* thicket

The Proposal area is located in two mapped IBRA Bioregions and Sub- regions, namely:

SLK Range	IBRA Bioregion	IBRA Sub Region	Vegetation Associations
340.86 – 351.35	Avon Wheatbelt	Merredin	8 and 1413
351.35 – 365.75	Coolgardie	Southern Cross	1068

Vegetation extents and percentage for each Bioregion and Sub- region are provided below:

Pre-European Vegetation Association	Scale:	Pre-European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Veg Assoc No. 8	Statewide	694,638	346,425	49.87	6.77
	IBRA Bioregion Avon Wheatbelt	356,571	50,340	14.12	1.22
	IBRA Sub-region Merredin	353,871	49,941	14.11	1.23
	Local Government Authority Shire of Yilgarn	163,920	59,992	36.60	6.51
Veg Assoc No. 1068	Statewide	268,900	142,088	52.84	6.23
	IBRA Bioregion Coolgardie	193,988	104,804	54.03	13.15
	IBRA Sub-region Southern Cross	193,988	104,804	54.03	13.51
	Local Government Authority Shire of Yilgarn	268,900	142,088	52.84	6.23
Veg Assoc No. 1413	Statewide	1,679,916	1,286,855	76.60	13.22
	IBRA Bioregion Avon Wheatbelt	546,675	174,102	31.85	2.33
	IBRA Sub-region Merredin	546,676	174,102	31.85	2.33
	Local Government Authority Shire of Yilgarn	538,791	395,458	73.40	19.26

The location of the Proposal area is within mapped Vegetation Associations (VA) 8, 1068 and 1413, where there is greater than the 30% Statewide guideline level, namely 49, 52 and 76%, respectively. At an IBRA

Bioregion and Sub-region level, VA 1068 and 1413 are above 30%, whilst VA8 is at about 14%. At a Shire level, all of the Vegetation Associations are above the 30% guideline level, namely 36, 52 and 73%, respectively.

Of the 13.33 ha of clearing, 2.07 ha is mapped to occur in VA8, 8.35 ha in VA1068 and 2.91 ha in VA1413.

Vegetation mapping by Ecologia (2023) at a finer scale only recorded 0.15 ha of gimlet (*E. salubris*) open forest (VA8) within the Proposal area, compared to the mapped 2.07 ha using Beard (1976), suggesting that the proposed clearing of VA8 is less than first indicated.

Further, Ecologia only mapped one vegetation unit that contained Salmon Gum, being a 0.04 ha of vegetation featuring York Gum (*E. loxophleba*), Red flowering wattle (*E. erythronema*) and Merredin mallee (*E. leptopoda*), with isolated clumps of Mallee wandoo (*E. capillosa*) and Salmon Gum (*E. salmonophloia*). Accordingly, it is likely that up to 0.19 ha of vegetation roughly corresponding to VA8 (containing gimlet (*E. salubris*) and Salmon Gum (*E. salmonophloia*) is proposed to be cleared. This minor amount of clearing of vegetation of possible VA8 which is linear in nature adjacent to an existing road is not considered to be significant.

The majority of the proposed clearing of VA8 is located at the western end of the Proposal area. In this area, there is a large patch (nominally 1500 ha) of remnant vegetation. The proposed clearing of 0.19 ha of vegetation that may meet the species composition of VA8 represents 0.13 % of this remnant area.

The Proposal area straddles two IBRA Bioregions – Avon Wheatbelt and Coolgardie, the border of which is located 3.7 km from the mapped vegetation type containing gimlet (thought to represent VA8). Although there is approximately 14% of the pre-European extent of VA8 remaining in the Avon Wheatbelt Bioregion, there is approximately 98% of the pre-European extent of this vegetation association remaining in the Coolgardie Bioregion. Accordingly, the removal of 0.19 ha of this vegetation type is not considered to be significant as a remnant in this context.

The removal of 13.33 ha of native vegetation along the 23.5 km stretch of the existing road that is narrow and linear in nature and meets the 30% guideline level at a State and Shire level is unlikely to significantly reduce existing linkages between remnant patches of vegetation locally or regionally.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

- Commonwealth of Australia (2001)
- Biological Survey (Ecologia, 2023)
- Government GIS shapefiles:
 - Pre-European vegetation complexes (Accessed 21-Nov-2023)
- Statewide Vegetation Statistics (Government of Western Australia, 2019)

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

Proposed clearing is at variance to this Principle.

Mapping by Ecologia (2023) has identified 0.41 ha of *Tecticornia* chenopod shrubland within the Proposal area, associated with a saline depression, between SLK 357.9 and 358.2, as shown below:



The Atlas of Living Australia reports that *Tecticornia pergranulata* are mostly located on the boundaries of salt lakes and salty swamps all across southern Australia.

According to the Hydrology and Wetland GIS layers, the mapped area of *Tecticornia* chenopod shrubland is not located in a mapped watercourse or wetland, although a drainage line is mapped to the north of the mapped vegetation. It is considered that clearing of the *Tecticornia* shrubland portion of the Proposal area is growing in, or in association with, an environment associated with a watercourse or wetland.

Ecologia (2023) mapped the area of *Tecticornia* chenopod shrubland to be in Degraded condition. Alien species *Bromus diandrus* and *Mesembryanthemum nodiflorum* were present as key grassland and herbland components of this vegetation community, respectively.

Based on the above, the proposed clearing is at variance to this Principle. However, the proposed clearing will not have a significant residual impact to vegetation growing in, or in association with, an environment associated with a watercourse or wetland, given the small extent of the *Tecticornia* chenopod shrubland clearing, the degraded condition of the vegetation and the clearing not being associated with a major watercourse or defined wetland.

Methodology

- Atlas of Living Australia (2023)
- Biological Survey (Ecologia, 2023)
- Government GIS shapefiles:
 - Directory of Important Wetlands in Australia - Western Australia (DBCA-045) (Accessed 21-Nov-2023)
 - Ramsar Wetlands (Accessed 21-Nov-2023)
 - Surface_HydroLines_Regional (Accessed 21-Nov-2023)
 - Hydrography Linear (Hierarchy) (DWER-031) (Accessed 21-Nov-2023)

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Proposed clearing is not likely to be at variance to this Principle.

Natural Resource Management Soil Systems and CSIRO risk mapping indicates the soils of the Proposal area have a:

- low to moderate risk of land instability,
- moderate to high risk of wind erosion,
- low risk of water erosion,
- moderate high risk of salinity,
- low risk of flood hazard,
- moderate to high risk of waterlogging and inundation,
- low risk of surface acidity, and

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- low to extremely low risk of acid sulphate soils.

Given the linear nature of the clearing and sealing of areas for road construction, the proposed clearing is not likely to lead to appreciable land degradation. Standard erosion and dust management control measures will be implemented during construction to reduce the incidence of wind erosion.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

- CSIRO Acid Sulphate Soils risk mapping (Accessed 09-Nov-2023)
- Natural Resource Management SLIP Soil Systems
 - Soil landscape land quality – Water Erosion Risk (Accessed 21-Nov-2023)
 - Soil landscape land quality – Wind Erosion Risk (Accessed 21-Nov-2023)
 - Soil landscape land quality – Salinity Risk (Accessed 21-Nov-2023)
 - Soil landscape land quality – Surface Acidity (Accessed 21-Nov-2023)
 - Soil landscape land quality – Waterlogging Risk (Accessed 21-Nov-2023)
 - Soil landscape land quality – Flood Risk (DPIRD-007) (Accessed 21-Nov-2023)

(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.

Proposed clearing is not at variance to this Principle.

There are no Department of Biodiversity, Conservation and Attractions (DBCA) managed lands in the vicinity of the Proposal area (GIS Database). The nearest DBCA managed land is an un-named nature reserve approximately 5.6 km north of the Proposal area. This Class 1a Reserve (R 25801) is vested in the Conservation Commission of WA for the purpose of conservation of flora and fauna. At this distance, the proposed clearing is not expected to impact on the values of this reserve.

The proposed clearing of 13.33 ha of native vegetation along 23.5 km of road will not remove or significantly diminish any ecological linkages or buffers around conservation areas. No other impacts to conservation areas are expected.

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology

- Government GIS Shapefiles:
 - DBCA Legislated Lands and Waters & Lands of Interest (Accessed 21-Nov-2023)

(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.

Proposed clearing is not likely to be at variance to this Principle.

According to DWER-031 GIS mapping, the Proposal area may intersect with a minor watercourse near SLK 346 and 347 however, the Surface_HydroLines_Regional GIS layer does not map any watercourses crossing the Proposal area. A review of aerial photography over this SLK range does not indicate the presence of a watercourse.

The Proposal is not located within a Country Areas Water Supply (CAWS) catchment or Public Drinking Water Source Area. It is located within the Goldfields and Westonia Groundwater Areas, which are both proclaimed under the *Rights in Water and Irrigation Act 1914*. However, no dewatering, abstraction of groundwater or changes to drainage is proposed, therefore impacts to groundwater levels and quality are not expected.

Given the above, it is unlikely that the proposed clearing will cause any deterioration in the quality of surface or underground water.

The proposed clearing is not likely to be at variance to this Principle.

Methodology

- Government GIS Shapefiles:
 - RIWI Act, Surface Water Areas and Irrigation Districts (Accessed 09-Nov-2023)
 - CAWSA Part 2A Clearing Control Catchments (Accessed 09-Nov-2023)
 - RIWI Act, Groundwater Areas (Accessed 09-Nov-2023)
 - Surface_HydroLines_Regional (Accessed 09-Nov-2023)
 - Hydrography Linear (Hierarchy) (DWER-031) (Accessed 09-Nov-2023)

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

Proposed clearing is not likely to be at variance to this Principle.

The study area averages 294 mm of rainfall per year (BOM, 2023). Natural Resource Management Soil Systems and CSIRO risk mapping indicates the soils of the Proposal area have a:

- low risk of water erosion,
- low risk of flood hazard, and
- moderate to high risk of waterlogging and inundation.

Due to the linear nature of clearing, relatively flat terrain, and low rainfall, clearing is unlikely to cause or exacerbate the incidence or intensity of flooding and is therefore not likely to be at variance to this Principle.

Methodology

- BoM Website (Accessed 21-Nov-2023)
- Natural Resource Management SLIP Soil Systems
 - Soil landscape land quality – Water Erosion Risk (Accessed 21-Nov-2023)
 - Soil landscape land quality – Waterlogging Risk (Accessed 21-Nov-2023)
 - Soil landscape land quality – Flood Risk (Accessed 21-Nov-2023)

6 VEGETATION MANAGEMENT

Main Roads will avoid clearing native vegetation where possible. Where clearing cannot be avoided then this clearing is kept to a minimum.

7 REHABILITATION, REVEGETATION & OFFSETS

7.1 Revegetation and Rehabilitation

No temporary clearing will be undertaken as part of the Proposal activities.

7.2 Offset Proposal

No offset proposal is required as the proposed clearing will not result in significant residual impacts to native vegetation within the region.

8 STAKEHOLDER CONSULTATION

Main Roads will undertake stakeholder consultation in accordance with CPS 818 Condition 8.

9 COMPLIANCE WITH CPS 818

Table 8 summarises what further pre-clearing impact assessment is required in accordance with CPS 818.

Table 8. Summary of Additional Management Actions Required by CPS 818

Impact of Clearing	Yes/No or NA	Further Action Required
1. The CAR indicates that the clearing is 'At Variance' or 'May be at Variance' with one or more of the Clearing Principles.	Yes	No further action required. Although the clearing is 'at variance' to Clearing Principle (f) and no other Clearing Principle, the area of the proposed clearing is less than 0.5 hectares in size and the Clearing Principle (f) impacts only relate to: i. minor non-perennial watercourses; and ii. a wetland that is not a defined wetland.
2. 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.	No	No further action required
3. Clearing is at variance with Clearing Principle (g) land degradation, (i) surface or underground water quality and (j) the incidence of flooding.	No	No further action required.
4. The Proposal involves clearing for temporary works (as defined by CPS 818).	No	No further action required.
5a. Proposal is within a Region that: - has rainfall greater than 400mm; and, - is South of the 26th parallel; and, - works are necessary in 'Other than dry conditions'; and, - works have potential for uninfested areas to be impacted.	No	Standard Vehicle and Plant management actions from Annexure 204B (TABLE 204B.9.1), <u>Hygiene Checklists (D17#859669)</u> and <u>Vehicle, Plant and Machinery Hygiene Register Template (D23#179551)</u> will be applied.
5b. Do the proposed works require clearing within or adjacent to DBCA managed lands in non-dry conditions?	No	No further action required.
6. 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.	No	No further action required.
7. Weeds are likely to spread to and result in environmental harm to adjacent areas of native vegetation that are in good or better condition.	No	One Declared Pest and Weed of National Significance (Prickly Pear - <i>Opuntia</i> sp.) was recorded in the Proposal area at SLK 345.18 (RHS). This single individual will be controlled by Main Roads prior to works commencing.
8. Did an environmental specialist conduct the survey or field assessment?	Yes	The Environmental Specialist undertaking the biological assessments was suitably qualified and had more than three years' experience.

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Impact of Clearing	Yes/No or NA	Further Action Required
9. Did an environmental specialist prepare the Assessment Report and any other associated documentation including the VMP, Dieback Management Plan or Offset Proposal?	Yes	The Environmental Specialist preparing the Assessment Report and any other associated documentation including the VMP, Dieback Management Plan or Offset Proposal was suitably qualified and had more than three years' experience.

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11 APPENDICES

Appendix 1: CPS 818/17 condition 8 (e) (iii) Biological Surveys and Field Assessment Executive Summary and Report Conclusions

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

Main Roads Western Australia Wheatbelt Region (Main Roads) is planning works on Great Eastern Highway between Merredin and Southern Cross, including road widening along a number of sections and an intersection realignment at Carrabin. GHD Pty Ltd (GHD) was commissioned to undertake a biological assessment of the 107 km section (the 'project area'). The purpose was to delineate key flora, vegetation, fauna, soil, groundwater and surface water values to inform the design process and future approvals.

Potential project constraints – biological aspects

The key biological constraints identified within the project area are summarised below.

Native vegetation

An assessment of vegetation extents remaining, based on mapping by Beard (1972, 1980) indicates that the vegetation within the project area is not well represented in the locality and region. Pre-European vegetation association 1055, 1057 and 1081 have less than 30 % remaining at all scales. Vegetation association 8 has less than 30 % remaining at the bioregion and sub-region scales and association 36 has less than 30 % remaining at the bioregion, subregion and all Local Government Area (LGA) scales (Merredin, Westonia and Yilgarn). As such, these vegetation associations are considered as 'vulnerable' at these levels. At the LGA level within the Shire of Merredin, vegetation associations 1055 and 1057 have less than 10 % of their pre-European extents remaining, which categorises these vegetation associations as 'endangered' at the local level.

Vegetation associated with drainage lines and lower lying areas was recorded within the project area and was mapped as *Tecticornia* chenopod shrubland (VT8). A total of 7.62 hectares (ha) is present within the project area. This vegetation was recorded growing in a minor unnamed tributary approximately 500 m west of the Walgoolan Road intersection and was also recorded growing in association within a small salt lake approximately 3.7 km east of the Moorine Rock town site. This vegetation supports taxa associated with waterlogged, saline soils such as *Tecticornia* ?*pergranulata* subsp. *pergranulata* and *Tecticornia indica* subsp. *bidens*, and, therefore, is considered to support vegetation that grows in association with a watercourse.

Conservation significant ecological communities

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed, Critically Endangered TEC, *Eucalypt Woodlands of the Western Australian Wheatbelt* occurs within the project area. A total of 166.48 ha of this TEC was recorded throughout the project area. This vegetation was predominantly in condition 2-3 (110 ha). This TEC also aligns with the DPaW listed, Priority 3 PEC, *Eucalypt woodlands of the Western Australian Wheatbelt*.

Conservation significant flora species

One EPBC Act and *Wildlife Conservation Act 1950* (WC Act) listed flora taxa and six DPaW Priority-listed flora taxa were recorded within project area. These species are:

- *Eremophila resinosa* (Threatened under WC Act, Endangered under EPBC Act)
- *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)
- *Acacia filifolia* (Priority 3)

The DPaW-priority listed flora taxa, *Phebalium* ?*drummondii* was potentially recorded within the project area. This species was not able to be definitively identified as the Priority 3 plant species *Phebalium drummondii*, due to the absence of flowers and/or fruit.

Fauna habitat

The majority of the fauna habitats are not well-represented at local scale and regional scale due to large scale clearing in the Wheatbelt region. There is also limited connectivity to other remnants of vegetation at a local or regional scale, with the exception of the of the adjacent larger nature reserves that occur in the centre of the project area between Carrabin and Bodallin.

Conservation significant fauna species

Two EPBC Act and WC Act listed fauna species were recorded during the current survey, the Malleefowl (Vulnerable EPBC Act and Vulnerable (Schedule 3) WC Act) (as road kill) and the Rainbow Bee-eater. The Rainbow Bee-eater is a widespread migratory species that is unlikely to solely rely on the habitats present within the project area.

The mallee eucalypt woodlands and mixed shrublands provide suitable habitat for the Malleefowl within the project area, with the areas of greatest value adjoining vegetation which is well connected to other patches of remnant vegetation. It is likely that the Malleefowl utilises the project area for dispersal between remnants north and south of the highway. Although no breeding mounds were recorded during this survey, there is the potential for the Malleefowl to utilise the habitat within the project area for breeding.

Environmental approvals and referrals

The project is in concept design and there may be opportunities to avoid or minimise the impacts on these biological constraints through design. If they can be avoided or impacts to these minimised, it may negate the need for referral to Federal/State environmental agencies.

The following advice and recommendations on the potential environmental approvals and referrals consider the project area as a whole and the results from the biological assessment.

Department of the Environment

Referral to the Department of the Environment (DotE) under the EPBC Act is triggered if a proposed action has or potentially has a significant impact on any Matters of National Environmental Significant (MNES). The project may require referral to the Department of the Environment (DotE) for the following MNES:

- The population of Endangered *Eremophila resinosa*
- The Critically Endangered Threatened Ecological Community (TEC) *Eucalypt Woodlands of the Western Australian Wheatbelt*
- Malleefowl (Vulnerable)
- Carnaby's Black Cockatoo (Endangered)

Environmental Protection Authority

In the absence of a broader environmental assessment, the majority of the potential biological impacts associated with the project area are linked to native vegetation clearing and loss of fauna habitat. The potential impacts from the loss of native vegetation and loss of fauna habitat may be effectively assessed through the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. Therefore with consideration of the biological values discussed in this report, it is considered unlikely that the project area would require referral to the EPA under Section 38 of the EP Act.

Department of Environment Regulation

The clearing of native vegetation in Western Australia requires a permit under Part V of the EP Act, unless an exemption applies. Main Roads has been granted a State-wide vegetation clearing permit (Clearing Permit CPS 818 and 817) which allows Main Roads to clear native vegetation for road projects and associated activities (including preconstruction activities).

The Federal and Western Australia governments have entered into a bilateral agreement under the EPBC Act relating to environmental assessment (assessment bilateral agreement). Specifically, this agreement now includes the clearing permit assessment process under Part V Division 2 of the EP Act. Under the assessment bilateral agreement, if a native vegetation clearing permit is required and the clearing will have, or is likely to have an impact on a MNES, the assessment of the clearing application including the potential impacts to the MNES can be conducted by the Department of Environment and Regulation (DER).

One flora and two fauna species listed under the EPBC Act (MNES) were recorded within the project area during the field survey, and two fauna species were considered likely to occur. A total of 166.48 ha of the EPBC Act listed, Critically Endangered TEC, *Eucalypt Woodlands of the Western Australian Wheatbelt* occurs within the

project area. Any clearing permit application should assess the significance of any potential impacts on these MNES and can be conducted by the DER.

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

Main Roads Western Australia engaged Astron Environmental Services to undertake a detailed biological assessment of the Carrabin realignment and a resurvey between straight line kilometres 258.5 to 365.5 to confirm the presence and extent of the 'Eucalypt Woodlands of the Western Australian Wheatbelt' threatened ecological community, in accordance with approved conservation advice.

A total of 71 confirmed vascular flora species were recorded within the Carrabin realignment. No EPBC Act or State-listed threatened flora were recorded. Two State listed priority 3 flora were located: *Acacia ancistrophylla* var. *perarcuata* and *Acacia crenulata*. Both species occurred within the Eucalypt Woodland vegetation type. Three threatened flora, one priority 2, seven priority 3 and one priority 4 flora species are considered likely to occur within the Carrabin realignment, despite not being located during targeted searches.

The Carrabin realignment included 34.6 ha of native vegetation. Two vegetation types were recorded in the survey area; Eucalypt Woodland and Shrubland.

The Eucalypt Woodland vegetation type within the Carrabin realignment, represents the State listed priority 3 community 'Eucalypt Woodlands of the Western Australian Wheatbelt' and accounts for 5.6 ha (14.6 %) of the survey area. Where it is of very good or excellent condition, this vegetation type also represent the critically endangered, federally listed, 'Eucalypt Woodlands of the Western Australian Wheatbelt' threatened ecological community. The threatened ecological community here accounts for 3.8 ha (9.9%) at the north-western end of the survey area.

Weed diversity was considered very low, with only one weed species recorded in the Carrabin realignment; **Arctotheca calendula* (Cape weed). This species is not listed as a Weed of National Significance nor listed as a declared pest plant in Western Australia under the Biosecurity and Agriculture Management Act 2007.

Two broad fauna habitats were recorded in the Carrabin realignment; the eucalypt woodland habitat, and shrubland habitat. No conservation significant fauna were identified within the Carrabin realignment. However, two threatened fauna species were considered to have a high likelihood of occurring; malleefowl (*Leipoa ocellata*) and Carnaby's cockatoo (*Calyptorhynchus latirostris*).

The survey area contained 30 mature trees which can be considered potential breeding habitat for Carnaby's cockatoo, including six trees with large hollows, although, preliminary inspection of the hollows from the ground did not show signs of recent or historic use as nest sites. These trees occurred within the eucalypt woodland habitat. The eucalypt woodland habitat represents potential breeding, potential roosting, and high quality foraging habitat for Carnaby's cockatoo over 5.59 ha (14.6%) of the Carrabin realignment.

The total area of the federally listed 'Eucalypt Woodlands of the Western Australian Wheatbelt' critically endangered threatened ecological community mapped across the project area, from straight line kilometre 258.5 – 365.5, was 109.1 ha (8.0%).

The areas mapped across the project area as the threatened ecological community were grouped into six broad vegetation communities. Five of these communities also match the description of the State listed priority 3 community 'Eucalypt Woodlands of the Western Australian Wheatbelt'. One community (*Eucalyptus longicornis*, *E. salmonophloia* and *E. salubris* woodland) is also inferred to represent the State listed priority 1 community 'Red Morrel Woodlands of the Western Australian Wheatbelt'.

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

ecologia Environment (ecologia) was commissioned by Main Roads Western Australia (Main Roads) to undertake a desktop assessment of an 38.8 km section of the Great Eastern Highway (GEH) (Project Area 4, Packages 6, 7 and 8), totalling approximately 512 ha in area between Walgoolan and Southern Cross (Straight Line Kilometre (SLK) SLK 327 – 365.8), Western Australia (herein referred to as the 'study area', Figure 4-1). This section of the GEH is deteriorating in condition as a result of wear age and wear, resulting in poor safety and efficiency outcomes. The study area is associated with Main Roads proposed construction works to improve the quality of the GEH including widening and overlay, townsite improvements and bridge widening. Main Roads requires a desktop assessment to aid in identifying future flora survey requirements in the area and potentially the preparation of a Clearing Impact Assessment (CIA), a Vegetation Management Plan (VMP), and

the information may be used to assist in the preparation of State and/or Commonwealth environmental referral documentation.

Based on the review of the DoEE's Protected Matters Searches Tool, the DBCA's NatureMap and FloraBase databases and the DBCA's Species & Communities Branch (threatened and priority flora) database search results, along with interrogation of the results GHD's 2015 biological assessment, 24 conservation significant flora species were assessed as 'possibly' occurring within the vegetation associations found within the study area (Great Eastern Hwy SLK 327 – 365.8). These include three Threatened, seven Priority 1 and 14 Priority 3 taxa. No significant species have been previously recorded immediately within the study area. To verify to presence or absence of the 'possibly' occurring species, it is recommended that targeted surveys be conducted during their optimal flowering periods. The flowering periods for the majority of the species assessed as 'possibly' occurring is between August and November.

Ecologia (2020) Great Eastern Highway Walgoolan to Southern Cross: Packages 6 to 8: SLK 327 to 365.8 Targeted Flora Survey

Main Roads Western Australia (Main Roads) is proposing to upgrade the Great Eastern Highway between Walgoolan and Southern Cross in Western Australia (Package 1A: SLK 290.5 to 293, Package 3: SLK 202.2 to 306.5, Package 4B and 5: SLK 311 – 327 and Package 6 to 8: SLK 327 to 365.8). A reconnaissance flora and vegetation survey of the study area was previously undertaken by GHD in 2015 (GHD 2016) with a follow-up targeted survey conducted in 2016. A supplementary desktop assessment of the study area was conducted by *ecologia* Environment (*ecologia*) in September 2019 to determine the likelihood of occurrence of any Threatened and Priority flora within the survey area. Following *ecologia*'s September 2019 report Main Roads commissioned *ecologia* to conduct a targeted survey for Threatened and Priority listed flora identified as likely or potentially occurring in the study area. This report addresses the results of the targeted search for 21 Threatened and Priority taxa identified as possibly or previously occurring Package 6 to 8: SLK 327 to 365.8.

The targeted flora survey was undertaken by two *ecologia* botanists between the 26th and 27th of September 2019. Areas of habitat within the survey area that had been assessed by GHD to be in 'Good' or better condition that were inside, or adjacent to the survey area were searched for the targeted Priority flora. In the field any vegetation within the survey area that appeared to be in 'Good' condition or have suitable habitat that was not included in the GHD assessment was also searched.

None of the Threatened or Priority species listed were observed within the study area nor were any other Threatened or Priority taxa. This is consistent with previously the previous GHD survey of the study area in 2016 and DBCA database records.

Ecologia (2023) Walgoolan – Southern Cross Package 8 Great Eastern Highway (H005) Biological Survey

Main Roads Western Australia (Main Roads) is proposing to upgrade Great Eastern Highway (GEH) between Walgoolan and Southern Cross (Package 8 - SLK 340.86 to SLK 365.75) including an upgrade to the GEH and Parker Range Road Intersection.

The project area was previously surveyed by GHD in 2015 to support the Walgoolan to Southern Cross road upgrade works. However, given that these surveys are now more than five years old, the associated reporting and data cannot be used to support environmental approvals without a review and update of the data and re-survey of the survey area. *Ecologia* Environment (*ecologia*) was engaged by Main Roads to conduct a biological survey of the survey area in September 2022. The new survey includes detailed flora and vegetation survey, a basic fauna and fauna habitat assessment, and a black cockatoo assessment.

Flora and Vegetation Assessment

A total of 195 vascular plant taxa representing 43 families and 117 genera were recorded within the survey area, including records made by GHD in 2015. No *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Biodiversity Conservation Act 2016* (BC Act) listed Threatened or Priority species were recorded. Twenty-two introduced plant species were recorded, of which one (*Opuntia* sp.), is listed as a Declared Pest and Weeds of National Significance (WONS) and was recorded from a single location.

Sixty-one sampling sites (four quadrats, eleven vegetation description sites and 46 vegetation observation sites) were assessed within the survey area including resurvey of GHD sites. Fourteen vegetation types were described by GHD within the survey area, twelve vegetation types were recorded in the current survey. Nine of

these were consistent with GHD vegetation descriptions with only one minor change. Five vegetation types mapped by GHD within the survey area were considered not to occur. Three of these have been remapped as new vegetation types. Vegetated areas were mostly in Very Good to Excellent condition according to the EPA (2016) scale.

Eucalypt Woodland of the Western Australian Wheatbelt Threatened Ecological Community (TEC) has been mapped as potentially occurring within the survey area. Fourteen patches of Eucalypt woodland were assessed against minimum threshold criteria for inclusion in the TEC. Two patches were considered to meet minimum threshold criteria for inclusion in the TEC: EW12 (1.09 ha) and EW13 (0.88 ha) both are considered to be Category A.

There were no other plant communities observed that corresponded to any state (BC Act) or Commonwealth (EPBC Act) listed TEC, or any state listed Priority Ecological Community (PEC).

Fauna and Fauna Habitat Assessment

Fauna habitat assessments were undertaken at 16 sites to describe representative habitat types present within the survey area. Two habitat types were identified within the survey area: Woodland (Open) and Shrubland (Open). The remainder of the survey area is comprised of cleared areas: Cleared (road) and Cleared (other). All habitat types identified within the survey area are considered generally common at a local and regional level. Habitat condition ranged from 'Completely Degraded' to 'Excellent' with impacts from introduced herbivores, weed infestations, and fire resulting in lower condition ratings for several habitat assessment sites.

Thirty-five vertebrate fauna species were recorded during the survey including two mammals (one introduced), 29 birds and four reptiles. Fauna recorded during the survey were generally common and are not restricted to the survey area. No significant vertebrate fauna were recorded during the survey.

Although the malleefowl (*Leipoa ocellata*) was not recorded during the current survey, this species was previously recorded by GHD within the survey area and may utilise Woodland (open) habitat within the survey area. Based on the presence of numerous records in close proximity to the survey area, this species is considered likely to utilise habitat within the survey area during dispersal and foraging activities. Although no evidence of breeding activity (mounds) was recorded during the current or previous survey, this does not preclude habitat within the survey area from being utilised for breeding in the future.

DBCA database searches identified two birds (peregrine falcon and common greenshank) and one mammal (chuditch) within 20 km of the survey area, none of which were recorded during the current survey and were all deemed as having a low likelihood of occurrence due to the absence of suitable habitat and/or distance of records. An additional species (Carnaby's cockatoo) identified using the Protected Matters Search Tool is considered unlikely to occur, as the survey area is located outside of the modelled distribution for this species.

Targeted searches within suitable habitat were undertaken for the short-range endemic invertebrate (SRE) tree-stem trapdoor spider (*Aganippe castellum*); however, no burrows were recorded from the survey area, and this species was assessed having a low likelihood of occurrence rating due to the presence of a single historical record 5 km from the survey area and high degree of disturbance within potential habitat encompassed within the survey area.

Black Cockatoo Assessment

An assessment was undertaken to investigate potential breeding habitat, night roosting habitat, and foraging habitat for the three black cockatoo species within the survey area. The north-west corner of the study area falls within the modelled distribution of the Carnaby's cockatoo species; however, the modelled distribution of this species does not intersect the survey area. The study area does not intersect the known distribution of the forest red-tailed black cockatoo or Baudin's cockatoo. No database records of the Carnaby's cockatoo have been recorded within 20 km of the survey area.

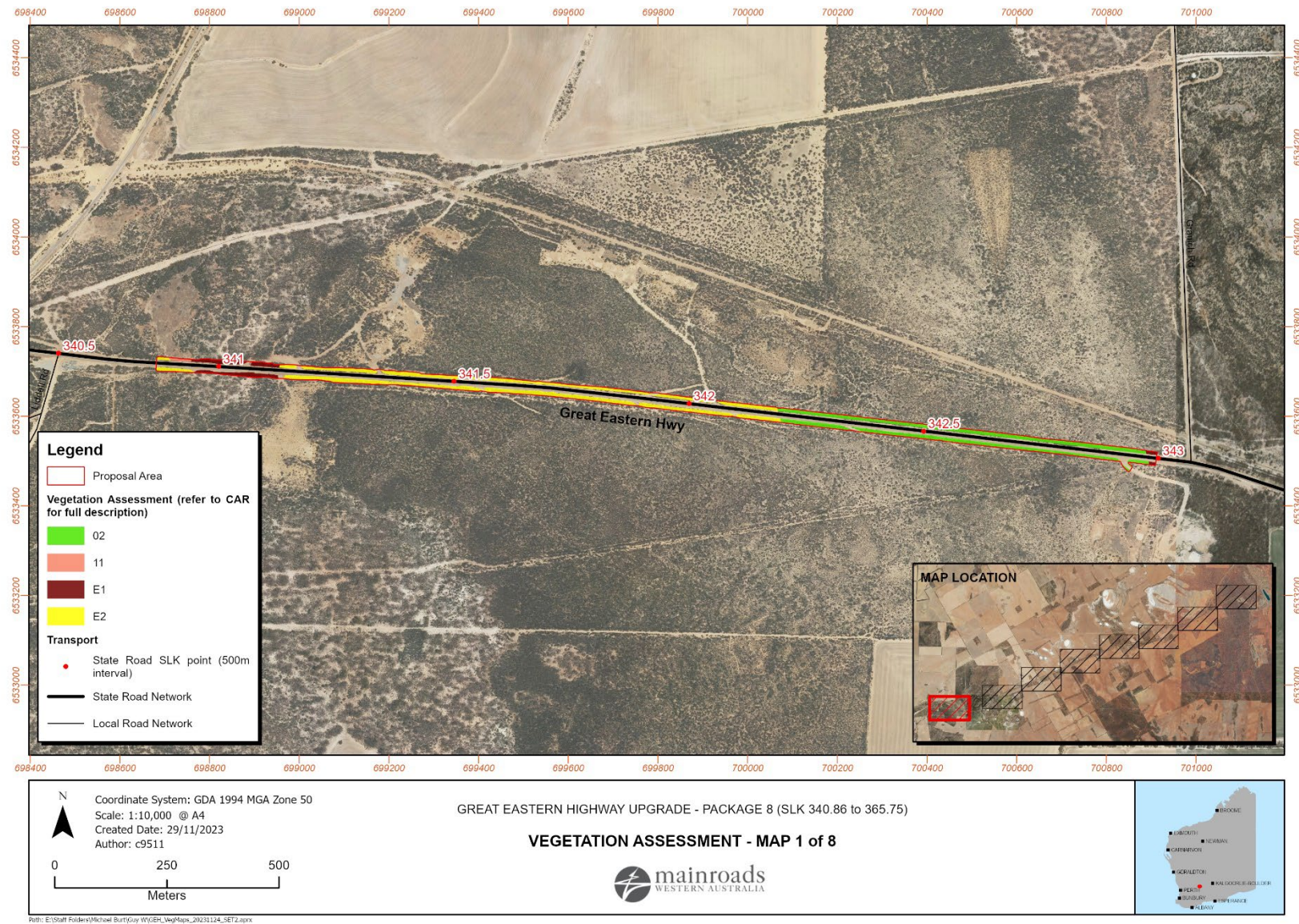
No primary or secondary evidence of black cockatoos was recorded during the field survey. Although a total of 20 habitat trees (> 500 mm DBH) were recorded within survey area, all trees either lacked hollows or contained hollows with characteristics unsuitable for black cockatoos. As the survey area is located outside of the known breeding range of all three black cockatoo species, it is unlikely that these trees represent current or future breeding or roosting habitat for these species.

Black cockatoo foraging habitat within the survey area was assessed as being of negligible quality due to the general absence of primary foraging resources utilised by the Carnaby's cockatoo. Given the appropriate timing

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of the survey, location of the survey area outside the modelled distribution of the species, lack of primary or secondary observations, low quality of foraging habitat and the fact that no trees were recorded with suitable hollows, it is unlikely that Carnaby's cockatoos are currently utilising any of the trees within the survey area as breeding, foraging or roosting habitat.

Appendix 2: Vegetation within Proposal area



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