Clearing Assessment Report – CPS 818

We're working for Western Australia.

Great Eastern Hwy Upgrade

SLK 311.81-311.88

December 2022

EOS 1775

D22#1077322 / D24#432795
December 2022

Contents

List Figures

List of Tables

List of Appendices

Document Control

Report Compilation & Review	Name and Position	Document Revision	Date
Author:	Senior Environment Officer	Draft v1	28/11/2022
Reviewer:	Environment Contractor	v1	20/12/2022

1 PROPOSAL

1.1 Purpose and Justification

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

Significant wear due to the age of the pavement along sections of GEH is severely affecting the safety and efficiency of the highway. This route has been identified as the third most risky road in regional WA in 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 2012-2016, 47 crashes were recorded along GEH, resulting in two fatalities, 17 major injuries and 22 hospital admissions or medical attention.

Main Roads Western Australia (Main Roads) is progressively upgrading sections of GEH between Walgoolan and Southern Cross. This project 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.

Main Roads plans to deliver Package 4B upgrade project in 2023, which will upgrade sections of GEH west and east of Bodallin. The start point of Package 4B has been extended by 70 metres (m) from Straight Line Kilometre (SLK) 311.88 to SLK 311.81, which is the subject of this CAR.

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

The scope of the proposal includes the following:

- Pavement reconstruction and widening of GEH to achieve an 11 m wide seal on an 11 m wide formation.
- New road delineation, signage and line marking, including a 1 m wide centre line.
- Upgrade drainage infrastructure and improve road drainage.

1.3 Proposal Location

The Clearing Area is located on Great Eastern Hwy, between SLK 311.81 and 311.88, approximately 5 kilometres (km) west of Bodallin, in the Shire of Yilgarn, as shown in Figure 1.

1.4 Clearing Details

Proposed Clearing to be undertaken using CPS 818: 0.08 ha

Areas of Native Vegetation Clearing:
The areas of native vegetation to be cleared are shown in **Error! Reference source not found.**.

Type of Native Vegetation:
The type of vegetation to be cleared under this Proposal is *Allocasuarina* tall shrublands and shown in **Error! Reference source not found.**.

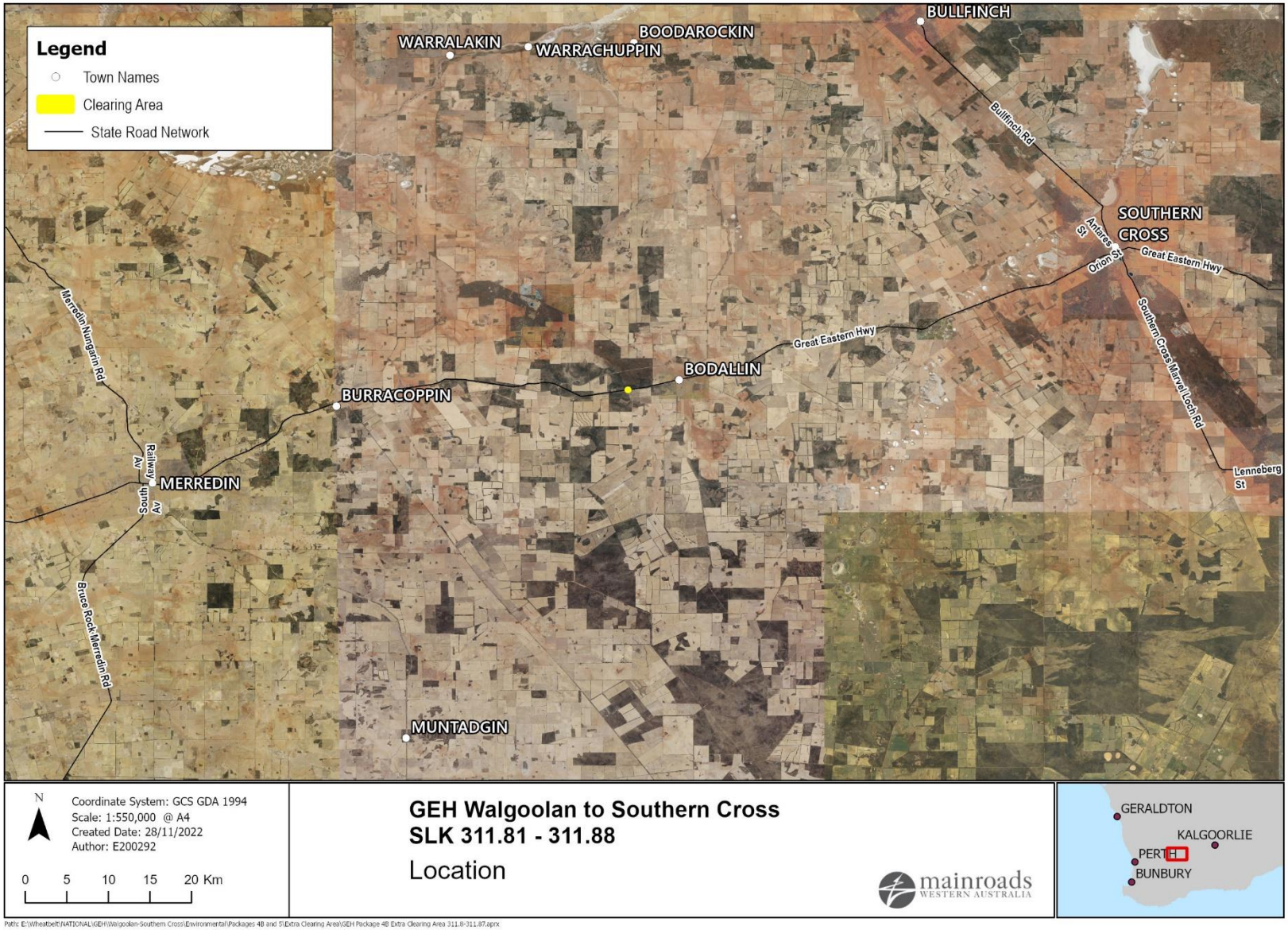

Figure 1. Proposal Location

Figure 2. Clearing Area

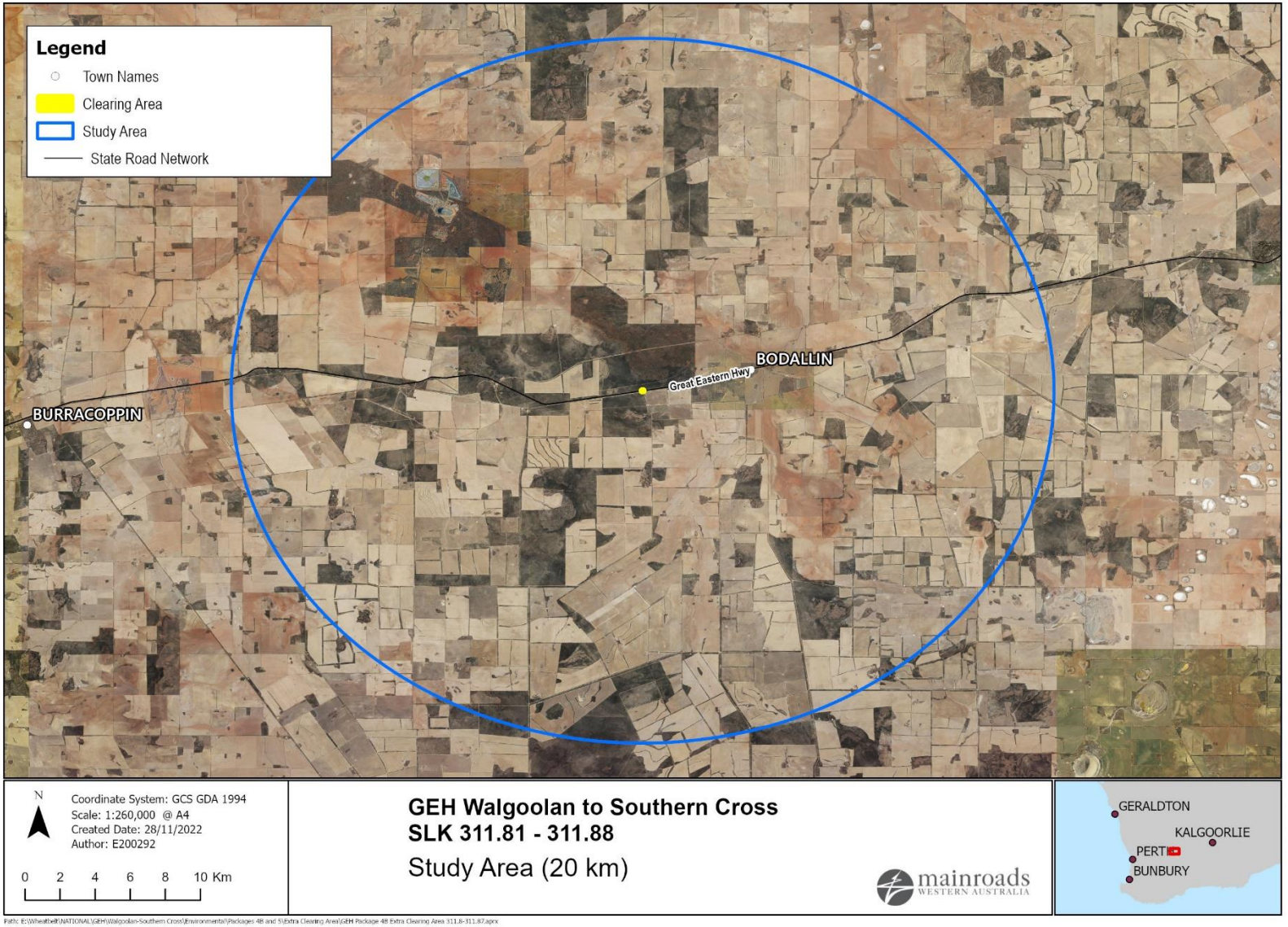

Figure 3. Study Area

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 realigning GEH in cleared pasture areas – this option is not practicable given the clearing forms part of a larger project to upgrade GEH on the existing alignment. Realigning GEH is not feasible given the cost, land requirements outside the road reserve and the option would still require clearing vegetation.
- Upgrading other alternative routes that are less vegetated and environmentally constrained, however these are not suitable as GEH is the primary route.
- 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.
- Reducing the speed limit to minimise clearing requirements, while still balancing safety (driver fatigue) and freight efficiency. This is not relevant to the project as the road pavement condition is poor and requires reconstruction regardless of posted speed.

Temporary ancillary activities such as site offices, storage areas, laydown areas and stockpiles will be restricted to previously cleared areas. Materials for the project will also be sourced from existing cleared areas such as farm paddocks to avoid additional clearing.

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 proposed clearing is to upgrade GEH on the existing alignment. Deviation from the existing centreline to align clearing to one side of the existing road would increase the Clearing Area and is not consistent with the larger upgrade project.
Alternative alignment located within pasture or degraded areas	Not considered for the proposed clearing as GEH is not being realigned to an alternative location.
Simplification of design to reduce number of lanes and/or complexity of intersections	The design has been simplified as much as practicable whilst meeting the safety outcomes of the project (i.e., sealed shoulders, audible edge line, 1 m wide centreline). The scope of the project was originally to widen GEH to a 12 m seal on a 12 m formation, however, this has been reduced to 11 m seal on 11 m formation.
Steepen batter slopes	Batters have been reduced from 1:6 to 1:4 where possible.
Installation of barriers	Not practicable for the scope of the project and would not reduce clearing given the requirement for a clear zone behind the barrier.
Use of existing cleared areas for access tracks, construction storage and stockpiling	Ancillary activities such as site offices, laydown areas, stockpile and material sources will be restricted to existing cleared areas. The only clearing required is what is necessary to upgrade GEH.

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*
- *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 (Department of Environment and Conservation, December 2014)
- Procedure: Native vegetation clearing permits (Government of WA, October 2019)
- 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.
- Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt (Department of the Environment, 2015).
- Carnaby's Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan (Department of Parks and Wildlife, 2013).
- Referral guideline for 3 WA threatened black cockatoo species (DCCEEW, 2022).

2 SCOPE AND METHODOLOGY OF CLEARING ASSESSMENT

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 (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.

- **Study Area** – Area covered by the Desktop Assessment. The Study Area for the Proposal is confined to a local area of a 20 km radius.

- **Survey Area** – Area covered by the various biological surveys, which are larger that the Clearing Area.

2.2 Desktop Assessment

A desktop assessment of the Clearing Area was undertaken by reviewing internal datasets and other government agency managed databases, and consulting with relevant stakeholders where necessary. Results from searches can be found in Appendix 2.

GIS layer viewing and mapping is done using ArcGIS Pro and 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 7.

2.3 Surveys and Assessments

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

- Detailed and targeted flora, fauna and vegetation survey (GHD, 2016)
- Targeted TEC and PEC survey (Astron, 2018)
- Significant flora desktop assessment (Ecologia, 2019)
- Targeted flora survey (Ecologia, 2020).

A summary of the methodology and the results of the above surveys are provided in Section 3.

3 SUMMARY OF SURVEYS

3.1 Overview of Surveys

Biological and targeted surveys conducted for the proposal are outlined in Table 2. A summary of the findings in these reports are presented in Sections 3.2 and 3.3.

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

Consultant & Survey Name	Survey Details
GHD (2016) Great Eastern Highway – Merredin to Southern Cross SLK 258.5–365.5 Biological Assessment	**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 was 107 km and on average 60 m wide. **Type:** Detailed vegetation, flora and fauna survey. The survey identified and mapped the dominant vegetation units, assessed vegetation condition and completed opportunistic searches for conservation significant ecological communities and flora and fauna taxa. Follow-up targeted searches of significant flora were also undertaken. **Timing:** Fieldwork conducted from 7 to 12 of October 2015. Targeted conservation significant flora survey was conducted on 20 January 2016. **Shapefile TRIM Ref:** D21#147901 **Document TRIM Ref:** D16#112460
Astron (2018) Great Eastern Highway – Merredin to Southern Cross SLK 258.5 – 365.5 Biological Assessment	**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 to 30 September 2018 **Shapefile TRIM Ref:** D21#147732 **Document TRIM Ref:** D21#147725
Ecologia (2019) Great Eastern Highway 311 – 327 SLK Desktop Assessment	**Survey Area:** Desktop assessment area comprised approximately 191 ha located along a 14.6 km section of GEH between Walgoolan and Southern Cross (SLK 311-327). **Type:** Supplementary desktop assessment to determine the likelihood of occurrence of any Threatened and Priority flora that may be impacted by the Proposal. **Timing:** October 2019. **Shapefile TRIM Ref:** N/A **Document TRIM Ref:** D21#292478
Ecologia (2020) Great Eastern Highway Walgoolan to Southern Cross: SLK 311 to 327 Targeted Flora Survey	**Survey Area:** Survey Area comprised 191 ha located along a 14.6 km of GEH between Walgoolan and Southern Cross. **Type:** Targeted survey for Threatened and Priority listed flora identified as likely or potentially occurring in the Survey Area. 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 25 and 26 of September 2019. **Shapefile TRIM Ref:** N/A **Document TRIM Ref:** D21#292491

3.2 Summary of Flora and Vegetation Surveys

A 60 m wide corridor was surveyed along GEH between Merredin and Southern Cross in 2016 (GHD 2016). The survey mapped nineteen vegetation associations not including highly disturbed areas. The GHD (2016) Survey Area was dominated by *Allocasuarina* tall shrubland and *Eucalyptus* woodlands. The vegetation condition ranged from Excellent to Completely Degraded and large areas surveyed had been impacted by past anthropogenic disturbances such as clearing, grazing and farming.

Section 4 provides a summary of the vegetation recorded in the Clearing Area.

Four of the vegetation types recorded during the GHD survey were inferred to represent the Eucalypt Woodlands of the Western Australian Wheatbelt (Eucalypt Woodlands TEC), which is listed as a Threatened Ecological Community (TEC) under the EPBC Act. This community is also synonymous with the state Priority Ecological Community (PEC) Eucalypt Woodlands of the Western Australian Wheatbelt (Eucalypt Woodlands PEC). None of these vegetation types are located in the Clearing Area.

Up to 392 flora taxa (including subspecies and varieties) representing 57 families and 166 genera were recorded from the GHD (2016) Survey Area. This total comprised 365 native species and 27 introduced (exotic) species, including planted species.

One Threatened and six Priority-listed flora taxa were recorded within the GHD (2016) Survey Area. These species included:

- *Eremophila resinosa* (Threatened under BC Act, Endangered under EPBC Act)
- *Acacia subrigida* (P2)
- *Acacia ancistrophylla* var. *perarcuata* (P3)
- *Acacia crenulata* (P3)
- *Leucopogon sp.* Ironcaps (N.Gibson & K. Brown 3070) (P3)
- *Verticordia mitodes* (P3)
- *Acacia filifolia* (P3).

An additional Department of Biodiversity, Conservation and Attractions (DBCA) Priority listed flora taxon, *Phebalium drummondii*, was potentially recorded within the GHD (2016) Survey Area. This taxon could not be definitively identified due to the absence of flowers and/or fruit. No Threatened or Priority flora recorded from the GHD survey are located in the Clearing Area.

Ecologia (2019) conducted a desktop assessment of flora considered possible or likely to occur along GEH between SLK 311-327. The desktop assessment reviewed the availability of suitable habitat for flora species based on vegetation mapping conducted by GHD (2016). The desktop assessment identified the following species as possibly occurring in the assessment area:

- *Boronia adamsiana* (T)
- *Gastrolobium diabolophyllum* (T)
- *Eremophila resinosa* (T)
- *Eremophila viscida* (T)
- *Acacia subrigida* (P2)
- *Acacia ancistrophylla var. perarcuata* (P3)
- *Acacia filifolia* (P3)
- *Austrostipa blackii* (P3)
- *Banksia horrida* (P3)
- *Eutaxia acanthoclada* (P3)
- *Lepidosperma sp.* Pigeon Rocks (P3)
- *Phebalium ?drummondii* (P3)
- *Verticordia mitodes* (P3)
- *Verticordia stenopetala* (P3)
- *Banksia shanklandiorum* (P4)

Ecologia (2020) conducted a targeted flora survey for the species identified as possible to occur in the desktop assessment. The survey did not record any of these species (or any other Threatened or Priority flora species), in the Survey Area.

Astron (2018) conducted a resurvey of vegetation inferred to represent Eucalypt Woodlands TEC by GHD. The assessment involved inspecting and reassessing each TEC patch against the diagnostic criteria and condition thresholds contained in the conservation advice (Department of the Environment, 2015). Astron also inspected *Eucalyptus*-dominated vegetation types to record additional patches of Eucalypt Woodlands TEC. A total of 109.1 ha of Eucalypt Woodlands TEC was recorded in the Survey Area. No vegetation representative of Eucalypt Woodlands TEC was mapped in the Clearing Area.

3.3 Summary of Fauna Surveys

The GHD (2016) survey identified six fauna habitat types in the Survey Area. Overall, while large sections of the surveyed area have previously been disturbed, where native vegetation remains it was mostly intact and provided habitat for fauna. The Clearing Area comprises one fauna habitat as described by GHD (2016).

Seventy-six fauna species, consisting of 62 birds, ten mammals, three reptiles, and one amphibian were recorded during the GHD (2016) survey. Of these, 67 were native species and nine were introduced species. One Threatened fauna species, Malleefowl, was recorded at the time of the survey. This record comprised one individual as roadkill approximately 10 km west of the Clearing Area. No Malleefowl breeding activity was recorded (i.e. nesting mounds). However, the mallee eucalypt woodlands, Allocasuarina shrublands and mixed shrublands provide suitable habitat for the Malleefowl within the GHD (2016) Survey Area.

In addition to Malleefowl, two other conservation significant fauna species were considered by GHD (2016) as likely to occur in their Survey Area based on suitable habitat, Carnaby's Cockatoo (*Calyptorhynchus latirostris*), listed as Endangered under the EPBC Act and BC Act, and Chuditch (*Dasyurus geoffroii*), listed as Vulnerable under the EPBC Act and BC Act.

The GHD (2016) Survey Area contained 506 trees with a suitable diameter at breast height (DBH) for Threatened black cockatoos, including 26 trees with suitable hollow(s) for breeding (GHD 2016). None of these trees showed any recent or historical signs of breeding (nesting use) by Carnaby's Cockatoo, nor was any breeding or roosting observed within the GHD (2016) Survey Area. No suitable DBH trees were recorded in the Clearing Area. While some of the habitat types within the GHD Survey Area contained suitable foraging species, none were considered to provide high quality foraging habitat for a Carnaby's Cockatoo. No evidence of foraging was recorded during the survey.

4 VEGETATION DETAILS

4.1 Proposal Site Vegetation Description

The proposal is located within the eastern Wheatbelt region, which is characterised by a mosaic of cleared agricultural land and patches of remnant native vegetation. In the local context, the vegetation is contiguous with large patches or remnant native vegetation associated with crown reserves to the north and south of the Clearing Area.

The Clearing Area comprises one vegetation type, *Allocasuarina* tall shrubland (VT03), which is described as the following (GHD, 2016):

- *Allocasuarina corniculata, Allocasuarina spinosissima* and *Allocasuarina campestris* tall shrubland with *Eucalyptus burracoppinensis* isolated mallees over *Chamelaucium pauciflorum* subsp. Perenjori (B.J. Conn 2181), *Euryomyrtus maidenii and Melaleuca conothamnoides* low open shrubland over *Amphipogon caricinus* var. *caricinus* isolated grasses over *Waitzia acuminata* var. *acuminata* and *Drosera* sp. isolated herbs.

Tables 3 and 4 provide details of the Pre-European Vegetation Associations within the Clearing Area and the remaining extents of these associations.

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

Table 3. Summary of Vegetation Types within Clearing Area

Vegetation Type	Extent within Clearing Area (ha)	Total Extent Mapped (ha) within Survey Area	Vegetation Condition (EPA 2016)
Allocasuarina tall shrublands	0.08 ha	266.93 ha	0.08 ha in Excellent condition

Table 4. Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale	Pre–European Extent (ha)	Current Extent (ha)	% Remaining	% Current Extent in DBCA Managed Land (proportion of pre-European Extent)
Veg Assoc No. 36	**Statewide**	495,431	226,242	46%	6%
	IBRA Bioregion Avon Wheatbelt	300,997	72,745	24%	3%
	IBRA Sub-region Merredin	300,997	72,745	24%	3%
	Local Government Authority Shire of Yilgarn	42,944	38,718	90%	82%

5 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, 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 proposed clearing is not likely to be at variance with the ten Clearing Principles.

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

Proposed clearing is not at variance to this Principle.

Assessment

The proposal requires the clearing of 0.08 ha of native vegetation, comprising one vegetation type described as *Allocasuarina* tall shrublands (VT03) in Excellent condition (GHD, 2016). This vegetation type is common along GEH, accounting for 40% of native vegetation recorded in the survey (266.93 ha).

The vegetation to be cleared occurs as two narrow, linear strips of vegetation. According to aerial imagery, the vegetation on the north side of GEH is contiguous with remnant vegetation associated unnamed nature reserve R16000. The vegetation on the south side of GEH forms part of a 40 m corridor of vegetation that occurs parallel to GEH and the Goldfields water supply pipeline. While the vegetation has been mapped in Excellent condition, a recent site inspection by Main Roads recorded evidence of anthropogenic disturbances such as historical clearing, burning and rubbish. Accordingly, the vegetation to be cleared is unlikely to contain a relatively higher level of biodiversity compared to surrounding vegetation.

According to the desktop assessment, four PECs are known to occur in the Study Area:

- Red Morrel Woodlands of the Wheatbelt (P1)
- Eucalypt Woodlands of the Western Australian Wheatbelt (P3)
- Salmon Gum Woodlands of the Wheatbelt (P3)
- Gimlet Woodlands of the Wheatbelt (P3).

These PECs are synonymous with the EPBC Act-listed Eucalypt Woodlands TEC. The vegetation to be cleared does not comprise Eucalypt woodlands and none of these PECs have been mapped in the Clearing Area (Astron, 2019). The vegetation to be cleared does not represent a TEC or PEC.

According to the desktop assessment, five Threatened and 15 Priority flora species have been recorded within the Study Area, of which four Threatened and eight Priority species may occur in the Clearing Area. The targeted flora survey did not record any significant flora species in the Clearing Area (Ecologia, 2020).

The Clearing Area comprises one fauna habitat type described as Allocasuarina tall shrublands. As discussed in principle (b), the vegetation may provide suitable habitat for malleefowl, shield-backed trapdoor spider and peregrine falcon. The biological assessment did not record any significant fauna or significant habitat in the Clearing Area at the time of the survey. Given the

narrow, linear nature of the Clearing Area and proximity to a major highway, the vegetation is not likely to contain a relatively high level of fauna diversity or significant habitat for fauna.

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

Methodology

- Biological Survey (GHD, 2016)
- Biological Survey and TEC Assessment (Astron, 2018)
- Targeted Flora Survey (Ecologia, 2020)
- Government GIS Database:
  - DBCA Threatened and Priority Ecological Community database search (Accessed 14/11/2022)
  - DBCA Threatened and Priority flora database search (Accessed 14/11/2022)
  - WA Herbarium Flora database search (Accessed 14/11/2022)

(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.

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

Assessment

One fauna habitat type has been mapped in the Clearing Area, being Allocasuarina tall shrublands. This habitat is typically quite dense, with an abundance of fallen branches, bark, and leaf litter present (GHD, 2016). The habitat was found to be well represented in the survey where the road reserve is next to larger remnants.

Four significant fauna species were identified in the desktop assessment as possibly occurring due to the presence of suitable habitat (GIS Database):

- *Leipoa ocellata* (Malleefowl - T).
- *Idiosoma* sp. (Shield-backed trapdoor spider – T or P3).
- *Falco peregrinus* (Peregrine falcon - OS).
- *Idiosoma intermedium* (Coolgardie shield-backed trapdoor spider – P3).

According to DBCA fauna records, none of these species have been previously recorded in the Clearing Area.

Malleefowl are found in arid and semi-arid areas dominated by mallee eucalypts on sandy soils. They are known to also occur in Mulga (*Acacia aneura*), Broombush (*Melaleuca uncinata*), Scrub Pine (*Callitris verrucosa*), *Eucalyptus* woodlands and coastal heathlands (DPaW, 2016). Previous records of this species are scattered throughout the Study Area, including several records in an adjacent nature reserve to the Clearing Area. The nearest record is an opportunistic sighting in 1997 approximately 70 m east of the Clearing Area (GIS Database). One malleefowl was recorded as roadkill during the fauna survey approximately 10 km west of the Clearing Area (GHD, 2016).

The Clearing Area may provide habitat for malleefowl given the vegetation comprises dense shrubs with scattered mallees over sandy soils, in particular on the south side of GEH. However, this species is unlikely to nest in close proximity to a major highway given the increased level of noise and disturbance (GHD, 2016). No evidence of malleefowl was recorded in the Clearing Area

during the biological assessment, and a recent site inspection by Main Roads found no evidence of breeding activity in the Clearing Area (Main Roads, 2022).

The vegetation may facilitate the movement of this species between patches of remnant native vegetation; however, the clearing will impact a relatively thin strip of native vegetation either side of GEH and there are large areas of native vegetation to the north and south of GEH that provides similar habitat. Therefore, the clearing will not disrupt the movement of this species across the landscape.

Shield-backed trapdoor spider is represented in the Study Area by an unspecified species (*Idiosoma sp*.) recorded 19 km north of the Clearing Area and Coolgardie shield-backed trapdoor spider (*Idiosoma intermedium*) recorded 5 km east of the Clearing Area. Based on a review of the known distributions of the *Idiosoma* shield-backed trapdoor spiders, *Idiosoma nigrum* (EN under the BC Act; VU under the EPBC Act) would not occur in the Clearing Area. According to Rix et al (2018), *I. nigrum* has a restricted distribution in the central and central-western Wheatbelt, with Durokoppin and Kellerberrin marking the eastern margin of this species (100 km from the Clearing Area).

The desktop review considered *I. intermedium* (not listed under either State or Commonwealth legislation) most likely to occur in the local area (Biota, 2022a). This species has a relatively widespread yet poorly defined distribution in the eastern Wheatbelt and north-western Coolgardie bioregions (Rix et al, 2018), and there is a known record in the Study Area. Biota (2022b) conducted a targeted survey for this species and *I. nigrum* along a 15 km section of GEH, immediately to the east of the Clearing Area. While the survey did not record either of these species, the survey located a previously unrecorded species of *Idiosoma*. The nearest record was an inactive burrow 1 km east of the Clearing Area and the nearest active burrow was recorded approximately 5 km east of the Clearing Area. Based on the habitat mapping completed during the survey, the specimens were recorded from tall open *Eucalyptus salubris* woodland on undulating plains, and many records from highly modified or rehabilitated areas (Biota, 2022b). The targeted search did not record any specimens in similar vegetation to the Clearing Area, indicating the Allocasuarina tall shrublands habitat type is not suitable for this species. Therefore, this species is not considered likely to occur in the Clearing Area.

Peregrine falcon is a highly mobile species with a large home range and utilises a variety of habitat types. The Clearing Area may provide suitable foraging habitat for this species, but peregrine falcon would not be reliant on the vegetation for foraging resources.

While GHD (2016) considered Carnaby's Cockatoo likely to occur in the survey area, the clearing area is located at the eastern most extent of the modelled distribution of the species' breeding range (DSEWPaC, 2012) and there are no records of this species in the Study Area. Furthermore, the clearing area does not contain any trees with a suitable diameter at breast height (DBH) to form breeding hollows (GHD, 2016). Given the absence of this species in the local area, the vegetation is not considered suitable foraging habitat.

While the Clearing Area contains vegetation that may form suitable habitat for significant fauna species, given the extent of native vegetation in the surrounding area and linear nature of the clearing, the vegetation is not considered significant habitat. The proposed clearing is not likely to be at variance to this principle.

Methodology

- Biological Survey (GHD, 2016)
- Government GIS Database:
  - DBCA Threatened and Priority fauna database search (Accessed 14/11/2022)
- Main Roads Site Inspection (16/11/2022)
- Shield-backed Trackdoor Spider desktop assessment (Biota, 2022)
- Species specific conservation listing advice and recovery plans

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

Proposal is not likely to be at variance to this Principle.

Assessment

The following four flora species have the potential to occur in the Clearing Area due to the availability of suitable habitat (Ecologia, 2019):

- *Boronia adamsiana*.
- *Eremophila resinosa*.
- *Eremophila viscida*.
- *Gastrolobium diabolophyllum*.

A targeted flora survey conducted along GEH did not record these species, or any other Threatened flora occurring in the Clearing Area (Ecologia, 2020).

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

Methodology

- Flora Desktop Assessment (Ecologia, 2019)
- Targeted Flora Survey (Ecologia, 2020)

(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.

Assessment

According to available databases, no TECs listed under the BC Act or EPBC Act are known to occur within the Clearing Area (GIS Database). As discussed under principle (a), Eucalypt Woodlands TEC (EN under the EPBC Act) is known to occur in the Study Area. According to the biological survey and targeted TEC assessment, none of the vegetation types recorded in the Clearing Area represent this TEC (GHD, 2016; Astron, 2020).

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

Methodology

- Biological Survey (GHD, 2016)
- Biological Survey and TEC Assessment (Astron, 2018)
- Government GIS Database:
  - DBCA Threatened Ecological Community database search (Accessed 14/11/2022)
  - EPBC Protected Matters Search Tool (Accessed 25/11/2022)

(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.

Assessment

The vegetation to be cleared has been broadly mapped as the following pre-European vegetation association (GIS Database):

- 36: Wattle, casuarina and teatree *Acacia-Allocasuarina-Melaleuca* alliance.

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). Vegetation association 36 retains over 30% at the state and local government scales but 24% at the IBRA bioregion and subregion scales.

According to statewide vegetation statistics, there is approximately 72,745 ha of vegetation association 36 remaining in the Avon Wheatbelt IBRA bioregion and Merredin subregion respectively (Government of WA, 2019). According to remnant vegetation mapping, there is approximately 11,035 ha of vegetation association 36 remaining in the 20 km surrounding the Clearing Area. The proposed clearing of 0.08 ha of vegetation represents approximately 0.001% of this vegetation association in the local area, and less than 0.0002% in the Avon Wheatbelt. Therefore, the proposed clearing will not significantly decrease the extent of this vegetation association in the local or regional area.

With regard to impacts to the local native vegetation extent, the proposed clearing is located in the Avon Wheatbelt IBRA bioregion, of which approximately 19% vegetation cover remains. The Study Area retains approximately 24% vegetation cover (approximately 30,205 ha). The proposed clearing comprises two thin, linear strips of vegetation either side of GEH. The Clearing Area on

the north side of GEH is contiguous with a large remnant patch of vegetation associated with unnamed nature reserves R16000 and R18584, comprising an area of approximately 2,295 ha. The Clearing Area on the south side of GEH forms part of a wide corridor of vegetation (approximately 40 m wide) that occurs between GEH and the Goldfields water supply pipeline. While the clearing occurs in the Wheatbelt region, which has undergone extensive clearing, the Clearing Area is bordered by large areas of native vegetation that will not be significantly impacted by the proposed clearing. Furthermore, the clearing will not remove any ecological linkages across the landscape.

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

Methodology

- Aerial imagery
- Government GIS Database:
  - Pre-European vegetation (Accessed 14/11/2022)
  - Native Vegetation Extent (Accessed 14/11/2022)
- 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 not at variance to this Principle.

Assessment

There are no watercourses or wetlands within the Clearing Area. No vegetation types growing in association with a watercourse or wetland have been recorded in the Clearing Area (GHD, 2016).

The proposed clearing is not at variance to this principle.

Methodology

- Biological Survey (GHD, 2016)
- Government GIS Database:
  - Geomorphic Wetlands (Accessed 14/11/2022)
  - Ramsar Wetlands (Accessed 14/11/2022)
  - Important Wetlands (Accessed 14/11/2022)
  - Watercourses (Accessed 14/11/2022
  - RIWI Act Rivers (Accessed 14/11/2022)

(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.

Assessment

According to state-wide soil mapping, the Clearing Area is described as gently sloping to gently undulating plateau areas, or uplands with long and very gentle slopes, chiefly comprising sandy yellow earths and yellow earthy sands on depositional slopes, and ironstone gravels on erosional ridges and slopes (Northcote et al, 1960-68).

The Clearing Area has a relatively flat topography (approximately 2%) and an average rainfall of 320 mm per annum (BoM, 2022). According to DPIRD land degradation risk mapping, the Clearing Area has a low risk of land degradation from water erosion, waterlogging, flooding and salinity, and a moderate risk of land degradation from 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. Main Roads standard erosion and dust management controls will be implemented through the Construction Environmental Management Plan 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

- Bureau of Meteorology climate data online (Noongaar weather station) (Accessed 14/11/2022)
- Government GIS Database:
  - Acid Sulphate Soil Risk Map (Accessed 14/11/2022)
  - Soil landscape land quality – Water Erosion Risk (Accessed 14/11/2022)
  - Soil landscape land quality – Wind Erosion Risk (Accessed 14/11/2022)
  - Soil landscape land quality – Salinity Risk (Accessed 14/11/2022)
  - Soil landscape land quality – Surface Acidity (Accessed 14/11/2022)
  - Soil landscape land quality – Waterlogging Risk (Accessed 14/11/2022)
  - Soil landscape land quality – Flood Risk (DPIRD-007) (Accessed 14/11/2022)
- WA Soils (Northcoate et al, 1960-68)

(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 likely to be at variance to this Principle.

Assessment

The following conservation areas are location in the Study Area:

- Unnamed nature reserve R 16000 (located 5 m north).
- Unnamed nature reserve R 18584 (located 3.4 km northwest).
- Unnamed nature reserve R 28562 (located 3.6 km west).
- Unnamed nature reserve R 18583 (located 6 km west).
- Carrabin Nature Reserve (located 10 km west).
- Unnamed nature reserve R 34197 (located 12.8 km southeast).
- Sandford Rocks Nature Reserve (located 15.65 km north).
- Unnamed nature reserve R 28940 (located 16.9 km south).
- Unnamed nature reserve R 40460 (located 19.5 km southeast).

The Clearing Area is adjacent to unnamed class-C nature reserve R 16000, which is vested in the Conservation and Parks Commission of WA for the purpose of conservation of flora and fauna. The reserve is approximately 1,713 ha. The proposed clearing is located entirely in the GEH road reserve and will not directly impact the environmental values of this reserve. Potential indirect impacts, such as the introduction or spread of weeds, will be managed under the CEMP, which will include measures to reduce the risk of introducing or spreading weeds into adjacent native vegetation. Based on the biological survey, very few weeds occur in the Clearing Area, therefore the potential spread of weeds into the nature reserve is unlikely.

The proposed clearing is not likely to affect other conservation areas in the Study Area given the small scale of clearing and distance to these areas.

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

Methodology

- Government GIS Shapefiles:
  - DBCA Legislated Lands and Waters & Lands of Interest (Accessed 14/11/2022)

(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.

Assessment

There are no watercourses or wetlands mapped within the Clearing Area. The proposed clearing is unlikely to result in significant changes to surface water flows.

The Clearing Area is not located in a Public Drinking Water Source Area. Groundwater salinity in the local area is mapped between 14,000-35,000 milligrams per litre total dissolved solids, which is considered saline. Noting the salinity level and the minor extent of the proposed clearing, the proposed clearing is not likely to cause deterioration in the quality of 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 14/11/2022)
  - RIWI Act, Groundwater Areas (Accessed 14/11/2022)
  - Soil landscape land quality - Salinity Risk (Accessed 14/11/2022)
  - Groundwater Salinity Statewide (Accessed 14/11/2022)

(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.

Assessment

The nearest weather station is Noongaar, which is 17 km northeast of the Clearing Area, with an average rainfall of approximately 320 mm per year (BOM, 2022). As discussed in principle (g), the Clearing Area has a low risk of flooding and waterlogging. There are no watercourses or wetlands within the Clearing Area. The proposed clearing is unlikely to increase the incidence or intensity of flooding.

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

Methodology

- BoM Climate Data Online (Accessed 14/11/2022)

6 COMPLIANCE WITH CPS 818

Table 5 summarises what further pre-clearing impact assessment is required in accordance with CPS 818.

Table 5. 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.	**No**	No further action required.
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 Principal Environmental Management Requirements (PEMRs) and Hygiene Checklists 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**	No further action required.

Impact of Clearing	Yes/No or NA	Further Action Required
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.
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.

7 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.

Biota Environmental Sciences (2022a) Walgoolan to Southern Cross Upgrade Project Targeted Shield-backed Trapdoor Spider Survey – Advice on Idiosoma. Memo prepared for Main Roads, by Biota.

Biota Environmental Sciences (2022b) Walgoolan to Southern Cross Upgrade Project – Targeted Shield-backed Trapdoor Spider Survey. Memo report prepared for Main Roads, by Biota.

Bureau of Meteorology Australia (2022) Climate Averages for Australian Sites – Noongaar – Available online from http://www.bom.gov.au/climate/data/index.shtml
Accessed 14/11/2022.

Department of Climate Change, Energy, the Environment and Water (2022) Protected Matters Search Tool Report. Available online from: http://www.environment.gov.au/epbc/pmst/index.html
Accessed 14/11/2022.

Department of Parks and Wildlife (2016) Fauna profiles: Malleefowl *Leipoa ocellata*. Retrieved from: http://www.dpaw.wa.gov.au.

Department of Environment and Conservation (2014) *A guide to the assessment of applications to clear native vegetation under Part V Division 2 of the Environmental Protection Act 1986*. Department of Environment Regulation. Perth, Western Australia.

Department of the Environment (2015) *Approved Conservation Advice (including listing advice) for the Eucalypt Woodlands of the Western Australian Wheatbelt*. Canberra: Department of the Environment. Available
from: http://www.environment.gov.au/biodiversity/threatened/communities/pubs/128-conservation-advice.pdf.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2012) *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black cockatoo*. Canberra, Australian Capital Territory.

Ecologia (2019) Great Eastern Highway 311 – 327 SLK Desktop Assessment. Report prepared for Main Roads WA, by Ecologia Environment.

Ecologia (2020) Great Eastern Highway Walgoolan to Southern Cross: SLK 311 to 327 – Regional 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.

Environmental Protection Authority (2020) *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*. 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

Government of Western Australia (2014a). *A guide to the assessment of applications to clear native vegetation Under Part V Division 2 of the Environmental Protection Act 1986*. Department of Environmental Regulation.

Government of Western Australia (2014b) *WA Environmental Offset Guidelines.* Perth, Western Australia.

Government of Western Australia (2011) *WA Environmental Offset Policy.* Perth Western Australia.

Main Roads WA (2022) Site Inspection Report – Great Eastern Hwy SLK 311.81-311.88, November 2022.

Northcote, K. H. with Beckmann, G. G., Bettenay, E., Churchward, H. M., Van Dijk, D. C., Dimmock, G. M., Hubble, G. D., Isbell, R. F., McArthur, W. M., Murtha, G. G., Nicolls, K. D., Paton, T. R., Thompson, C. H., Webb, A. A. and Wright, M. J. (1960-1968) Atlas of Australian Soils, Sheets 1 to 10. With explanatory data (CSIRO Aust. and Melbourne University Press: Melbourne).

Rix, M. G., J. A. Huey, S. J. B. Cooper, A. D. Austin, and M. S. Harvey (2018) Conservation systematics of the shield-backed trapdoor spiders of the nigrum-group (Mygalomorphae, Idiopidae, *Idiosoma*): integrative taxonomy reveals a diverse and threatened fauna from south-western Australia. ZooKeys 756:1–121.

8 APPENDICES

APPENDIX 1: Main Roads Environmental Site Inspection Report

D22#1244283