Clearing Assessment Report – CPS 818

We're working for Western Australia.

Great Eastern Highway Upgrade Package 3

SLK 302.2 – 306.65

November 2020

EOS 1772

Contents

1 PURPOSE

The purpose of this Clearing Assessment Report (CAR) is to provide a report detailing the assessment of native vegetation clearing that is proposed to be undertaken using the Statewide Clearing Permit CPS 818 issued to Main Roads Western Australia (Main Roads).

The CAR outlines the key activities associated with the project, the existing environment and an assessment of native vegetation clearing. This assessment provides an evaluation of the vegetation clearing impacts associated with the project using the ten Clearing Principles, and the strategies used to manage vegetation clearing.

2 SCOPE

2.1 Project Scope

Proposal Name: Great Eastern Hwy Upgrade Package 3 (SLK 302.2 to 306.65).

Proposal Purpose / Components: 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 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 2012-2016, 47 crashes were recorded along GEH, resulting in two fatalities, 17 major injuries and 22 hospital admissions or medical attention.

In addition to the poor condition of the road, this particular section of GEH between Straight Line Kilometre (SLK) 302.2 and 306.65 lacks adequate vertical and horizontal clearance under rail bridge 1575, which has led to a number of vehicle accidents or near misses. The bridge also lacks protection from vehicle strike.

Main Roads proposes to upgrade a 4.45 km section of GEH between the town sites of Carrabin and Bodallin. The upgrade will comprise the following components:

- Widen GEH to an 11 m seal on an 11 m wide formation;
- Pavement overlay, rehabilitation or reconstruction;
- New road delineation, signage and line marking, including a 1 m wide centre line;
- Upgrade drainage infrastructure and improve road drainage, especially around Bridge 1575 where runoff is causing erosion;
- Improve intersection with Smyth Rd;
- Improve safety features around Bridge 1575.

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.

The proposed clearing undertaking using CPS 818 is: Up to 5.43 ha of native vegetation clearing within a proposal area of 15.26 ha.

The proposed temporary clearing undertaking using CPS 818 is: N/A

Proposal Location(s): The proposal is located on GEH (H005), between SLK 302.2 and 306.65, approximately four kilometres east of Carrabin, in the Shire of Westonia and Shire of Yilgarn, as shown in Figures 1 - 3.

- MGA reference: Zone 50
- Start: 661991 mE, 6527611 mN
- End: 666052 mE, 6526088 mN

The following terms are used in this CAR:

- *Clearing area*: This area represents the area of native vegetation clearing for the proposal, comprising the designed earthworks and a buffer to allow for the movement of machinery during construction.
- *Proposal area*: the maximum area within which the clearing area will be located. This envelope is slightly larger than the clearing area to allow for minor changes to the proposal footprint as the design process continues, and account for unexpected changes that can occur during construction. The CAR has assessed all environmental values of the proposal area.

2.2 Assessment Report Scope

The assessment area is confined to a local area of a 20 km, as shown in Figure 2.

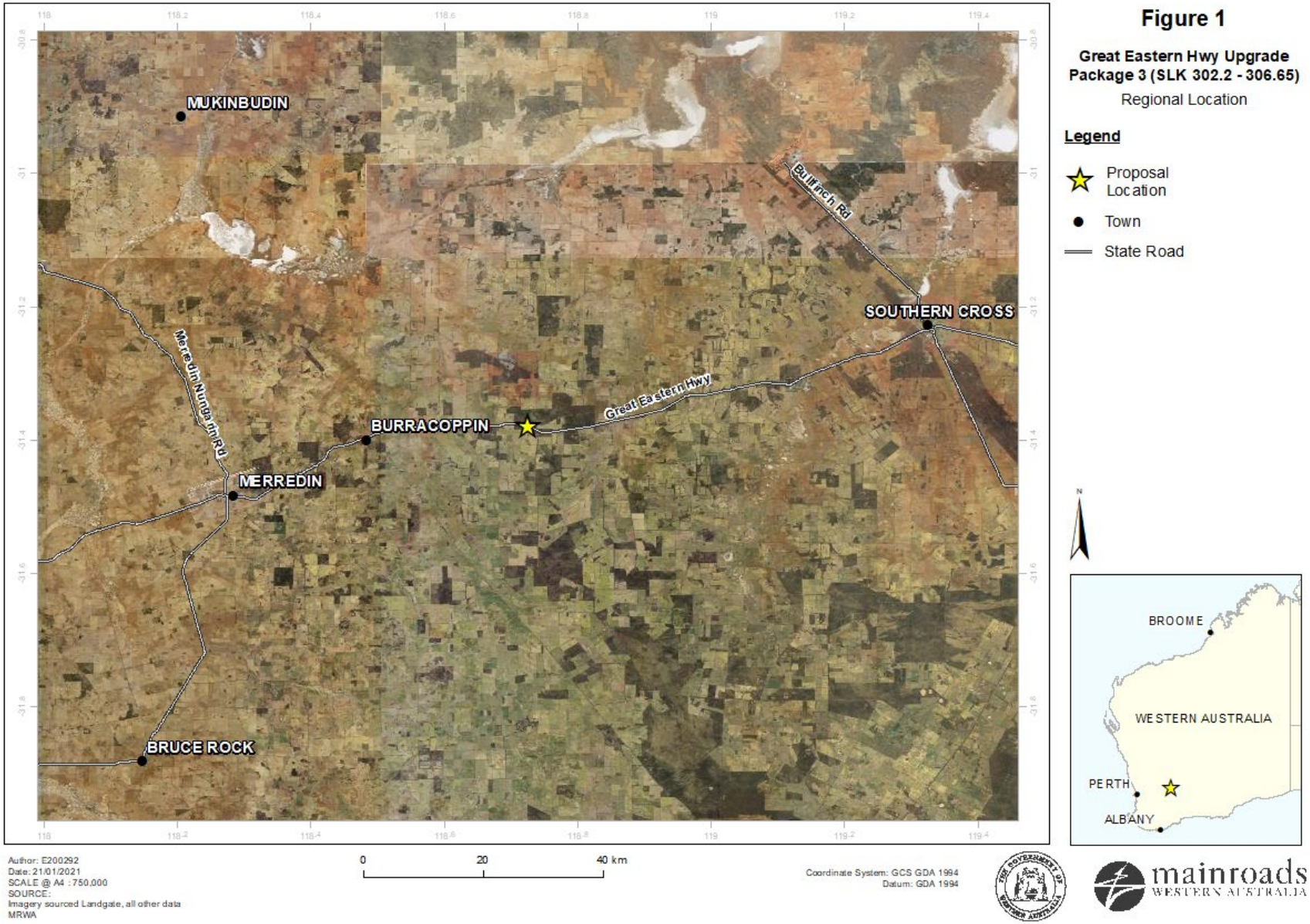

Figure 1: Proposal regional location

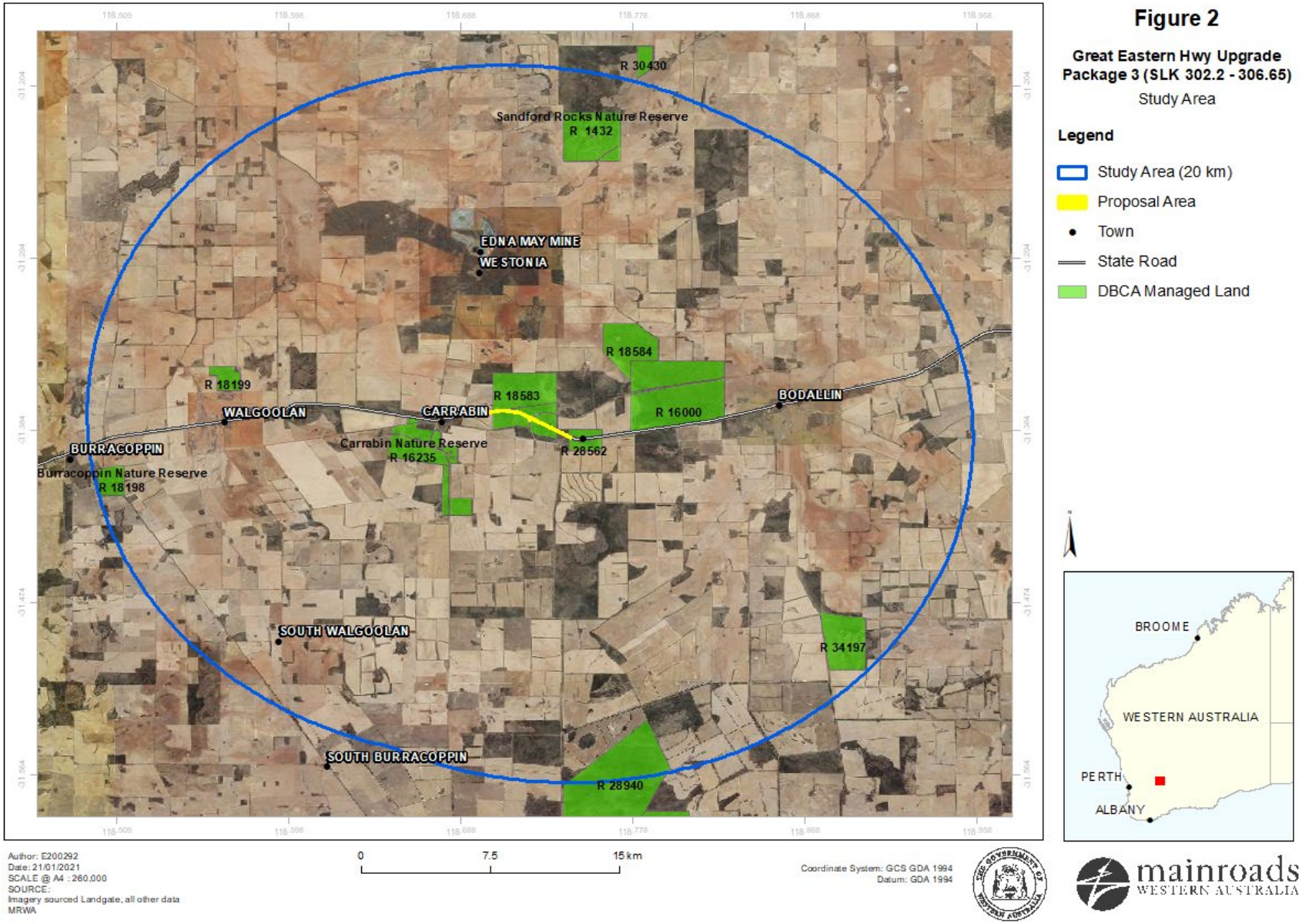

Figure 2: Proposal study area (20 km)

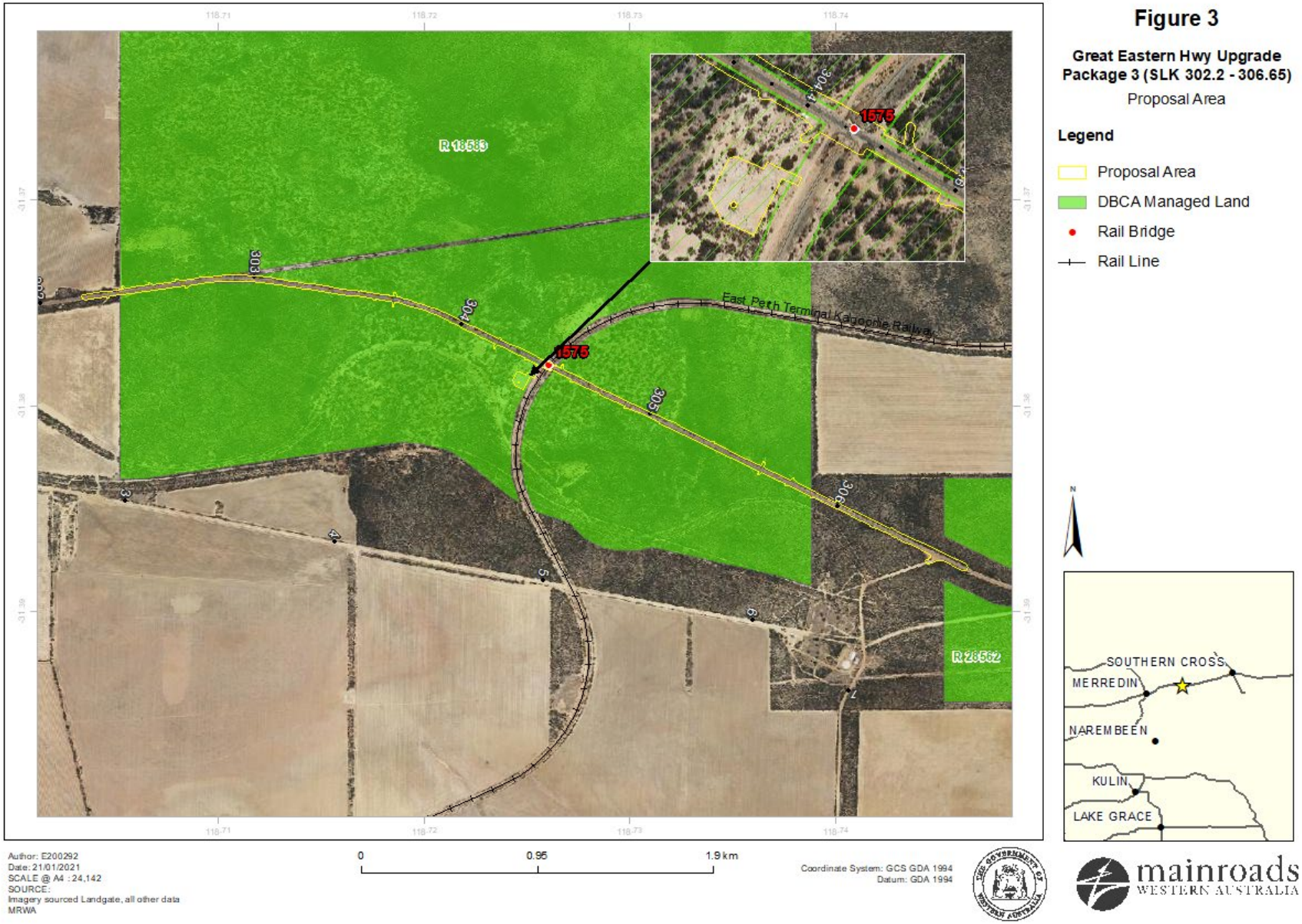

Figure 3. Proposal area

2.3 Alternatives to clearing

Main Roads has investigated a number of different options to improve the safety along this section of GEH, as well as reducing the risks to drivers when passing under Bridge 1575. This included a potential realignment of GEH and construction of a new road bridge south of the current alignment, and retaining GEH on its existing alignment but constructing a new rail bridge adjacent to the current bridge location. Both options would have resulted in a large area of native vegetation clearing.

Following additional investigations by Main Roads and consultation with relevant stakeholders, and noting the environmental values of the area, Main Roads intends to upgrade GEH on its existing alignment and retain and improve the current bridge. This significantly reduces the footprint required for the proposal, and limits vegetation clearing to narrow, linear areas of vegetation directly adjacent to the road.

2.4 Measures to Avoid, Minimise, Reduce and Manage Project Clearing Impacts

The design and management measures implemented to avoid and minimise the clearing impacts by the project are provided in Table 1.

Table 1. Measures undertaken to Avoid, Minimise, Reduce and Manage the Project Clearing Impacts

Design or Management Measure	Discussion and Justification
Steepen batter slopes	6:1 batter slopes will be used as per Main Roads standards. Due to the traffic volumes, vehicle type and posted speeds these batters cannot be changed significantly.
Alternative alignment to follow existing road (or) to preferentially locate within pasture or a degraded areas	The scope of the proposal is to upgrade and widen GEH along the existing alignment. Widening will utilise the existing cleared areas adjacent to the road, with only minor clearing required to achieve the full design width.
Simplification of design to reduce number of lanes and/or complexity of intersections	Main Roads considered a number of options to address the safety issues relating to where GEH passes under Bridge 1575, including realigning GEH to the south and constructing a new bridge over the railway, or constructing a new bridge adjacent to the current bridge location. Both options would have significantly increased the area of clearing required for the project. Following additional investigations and stakeholder consultation, Main Roads has simplified the scope of the proposal to widen GEH along its existing alignment, and install additional safety features around Bridge 1575. The design cannot be simplified any further without sacrificing the safety objectives of the proposal.
Preferential 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 alignment. Construction storage and stockpiling will be restricted to existing cleared or highly disturbed areas.
Drainage modification	Existing culverts will be replaced to improve surface water flow, in particular around Bridge 1575 where the existing drainage is causing soil erosion.

2.5 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 (see Section 1.3), Main Roads has also had regard to the below instruments.

Other Legislation of relevance 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)

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 (DEC, December 2014)
- Procedure: Native vegetation clearing permits (DWER, October 2019)
- Environmental Offsets Guidelines (Government of Western Australia, August 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 Recovery Plans for threatened species
- EPBC Act Referral guidelines for the three threatened black cockatoo species
- Strategic advice - EPA

3 SUMMARY OF SURVEYS

3.1 Biological Survey

The proposal area is included in the Great Eastern Hwy Merredin to Southern Cross SLK 258.5-365.5 Biological Assessment that was conducted in October 2015 and January 2016 by GHD.

A site inspection was undertaken by Main Roads (2020a) to inspect an area outside of the area surveyed by GHD, located approximately 60-160 m south of GEH near the Perth-Kalgoorlie Rail Line. The purpose of the survey was to confirm desktop extrapolation of vegetation types and condition.

Section 3.1.1 contains the summary of these surveys.

3.1.1 Summary of Biological Survey

A 60 m wide corridor was surveyed along GEH between Merredin and Southern Cross (GHD, 2016). The survey mapped five vegetation types within and adjacent to the proposal area, which can be generally described as Eucalypt woodlands, and *Allocasuarina* and *Acacia* shrublands. The vegetation condition ranges between 'very good' and 'completely degraded'. Two of the vegetation types 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 *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This community is also synonymous with the state Priority Ecological Community (PEC) Eucalypt Woodlands of the Western Australian Wheatbelt (Eucalypt Woodlands PEC).

The survey identified the presence of three Priority flora species; *Acacia subrigida* (P2), *Acacia ancistrophylla* var. *perarcuata* (P3) and *Acacia crenulata* (P3). The survey did not record any Threatened flora species.

In terms of fauna, the field survey recorded 76 fauna species, consisting of 62 birds, ten mammals, three reptiles, and one amphibian between Merredin and Southern Cross. Of these, 67 were native species and nine were introduced species. The only Threatened or Priority fauna species recorded at the time of the survey was one individual of Malleefowl (Threatened), which was recorded as road kill adjacent to the proposal area.

The vegetation was found to provide three habitat types; Allocasuarina tall shrublands, Mixed shrublands and Eucalypt woodlands. The Eucalypt woodlands habitat contained 21 trees with a suitable diameter at breast height (DBH) for Threatened black cockatoos, including five trees with a suitable hollow(s) for breeding. Six of the suitable DBH trees are within the proposal area, but none of these contain suitable breeding hollows (GHD, 2016). No Malleefowl breeding activity was recorded (i.e. nesting mounds).

The site inspection by Main Roads (2020a) found the remaining vegetation in the proposal area was consistent with the adjoining vegetation type VT14 – *Eucalyptus salubris* open forest over *Melaleuca sheathiana* tall shrubland. The vegetation, comprising approximately 3.34% of the proposal area, was found to be in a degraded condition from historical clearing, with vegetation limited to isolated trees and shrubs.

3.2 Eucalypt Woodlands TEC/PEC Surveys

Two additional Eucalypt Woodlands TEC/PEC surveys have been conducted for the proposal:

- Astron (2018) – Great Eastern Hwy Merredin to Southern Cross SLK 258.5-265.5 Biological Assessment was conducted in September 2018 by Astron Environmental Services Pty Ltd.
- Astron (2020) – Great Eastern Hwy Upgrade SLK 302.2 – 306.65 Threatened and Priority Ecological Community Assessment in May 2020 by Astron Environmental Services Pty Ltd.

3.2.1 Summary of TEC/PEC Surveys

Astron (2018) conducted a biological assessment of a potential realignment corridor for GEH, as well as a targeted Eucalypt Woodlands TEC assessment along GEH to verify patches inferred to represent the TEC by GHD. The targeted TEC assessment mapped 1.59 ha of Eucalypt Woodlands TEC within the proposal area and an additional 12.24 ha within 60 m of GEH.

Astron (2020) conducted a follow-up Eucalypt Woodlands TEC and PEC assessment in May 2020 to map the total extent of Eucalypt Woodlands TEC/PEC beyond the 2018 survey area. The survey was limited to Nature Reserve R 18583, which adjoins GEH. The survey mapped approximately 221 ha of Eucalypt Woodlands TEC/PEC in five separate patches. The survey also refined the patch boundaries mapped in the 2018 survey, resulting in a reduction in the community occurring in the proposal area (1.45 ha).

The survey also mapped approximately 83 ha of Salmon Gum Woodlands of the Wheatbelt ecological community. Department of Biodiversity, Conservation and Attractions (DBCA) has advised Main Roads that this community is under consideration to be listed as a PEC (pers. comm. Species and Communities Branch DBCA, 2020).

For the purposes of the survey, the community was mapped where Salmon Gum Woodlands occur in areas considered representative of the Eucalypt Woodlands TEC and PEC and have a woodland structure dominated by Salmon Gum. Approximately 0.67 ha of Salmon Gum Woodlands occurs in the proposal area.

3.3 Targeted Flora Surveys

A targeted flora survey was undertaken for the proposal:

- Ecologia (2020) – Great Eastern Hwy Walgoolan to Southern Cross Package 3: SLK 302.2 to 306.65 Targeted Flora Survey was conducted in September 2019 by Ecologia.

Main Roads (2020b) conducted a site inspection in January 2020 to locate priority flora recorded by Ecologia and search for significant species outside of the survey area.

Conservation significant flora were also recorded during the biological survey of the GEH realignment corridor (Astron, 2018), and opportunistically recorded during the Eucalypt Woodlands TEC survey (Astron, 2020).

3.3.1 Summary of Targeted Flora Surveys

Ecologia (2020) conducted a targeted flora survey in spring 2019. The intent of the survey was to search for conservation significant flora species considered likely or potentially occurring in the proposal area, based on the vegetation types recorded in the biological survey. The survey recorded additional individuals of *Acacia ancistrophylla* var. *perarcuata* and *Acacia crenulata*, and one individual of *Acacia filifolia* (P3). The survey could not locate the individual of *Acacia subrigida* recorded in the proposal area by GHD.

The site inspection by Main Roads (2020b) found additional individuals of *Acacia ancistrophylla* var. *perarcuata* and *Acacia crenulata* outside of the area surveyed by Ecologia. No additional *Acacia filifolia* were recorded.

Astron (2018) surveyed a 38 ha area associated with a potential realignment of GEH in spring 2018. The flora survey recorded 179 individuals of *Acacia ancistrophylla* var. *perarcuata* in the survey area. Targeted searches for this species were conducted outside of the survey area and recorded an additional 1,129 plants. One individual of *Acacia crenulata* was recorded 200 m south-west of GEH.

Astron (2020) opportunistically recorded conservation significant flora during the survey of Eucalypt Woodlands TEC/PEC in Nature Reserve R 18583. *Acacia ancistrophylla* var. *perarcuata* and *Acacia crenulata* were both found at numerous locations throughout the 454 ha survey area.

Table 2 provides a summary of the priority flora recorded by the various surveys along GEH between SLK 302 and 306 and surrounding vegetation. The table may include duplicate records; therefore, the total number of each species is indicative only.

Table 2: Summary of priority flora recorded in surveys

	Inside proposal area	Outside proposal area	Total
Acacia ancistrophylla* var. *perarcuata			
GHD (2016) Biological Survey Merredin to Southern Cross	76	220	296
Astron (2018) Biological Assessment Merredin to Southern Cross	11	1,295	1,306
Ecologia (2020) Targeted Flora Survey	171	39	210
Astron (2020) TEC / PEC Assessment	0	181	181
Main Roads (2020b) Site inspection	0	7	7
Acacia crenulata			
GHD (2016) Biological Survey Merredin to Southern Cross	30	209	239
Astron (2018) Biological Assessment Merredin to Southern Cross	0	1	1
Ecologia (2020) Targeted Flora Survey	55	0	55
Astron (2020) TEC / PEC Assessment	0	82	82
Main Roads (2020b) Site inspection	0	25	25
Acacia filifolia			
GHD (2016) Biological Survey Merredin to Southern Cross	0	0	0
Astron (2018) Biological Assessment Merredin to Southern Cross	0	0	0
Ecologia (2020) Targeted Flora Survey	1	0	1
Astron (2020) TEC / PEC Assessment	0	0	0

Main Roads (2020b) Site inspection	1	0	1
Acacia subrigida			
GHD (2016) Biological Survey Merredin to Southern Cross	1*	0	1
Astron (2018) Biological Assessment Merredin to Southern Cross	0	0	0
Ecologia (2020) Targeted Flora Survey	0	0	0
Astron (2020) TEC / PEC Assessment	0	0	0
Main Roads (2020b) Site inspection	0	0	0

*this record could not be located in the proposal area during subsequent surveys.

4 VEGETATION DETAILS

4.1.1 Proposal Site Vegetation Description

The proposal is located within the eastern Wheatbelt region. The proposal area is surrounded by Nature Reserve R 18583, which is a large vegetated reserve. Beyond the nature reserve, the landscape comprises a mosaic of cleared agricultural land and patches of remnant native vegetation.

The proposal area comprises the following five vegetation types (GHD, 2016):

- *Allocasuarina* tall shrubland (VT03);
- *Eucalyptus sheathiana* open mallee forest (VT04).
- *Eucalyptus capillosa* subsp. *capillosa* open forest (VT05);
- *Allocasuarina spp*. and *Acacia acuminata* tall shrubland (VT13);
- *Eucalyptus salubris* open forest over *Melaleuca sheathiana* tall shrubland (VT14);

Approximately 60% of the proposal area is already cleared. There are areas of degraded vegetation around Bridge 1575 from historical clearing. The remaining area is predominantly in 'Excellent' condition, with small areas in 'Excellent to Very Good' condition. Table 3 provides a summary of the vegetation condition within the proposal area:

Table 3. Vegetation condition of the proposal area

Vegetation Condition (EPA, 2016)	Area (ha)	Area (%)
Excellent	4.72	30.93%
Excellent to Very Good	0.55	3.59%
Degraded	0.67	4.39%
Cleared	9.32	61.08%

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

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

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

Pre-European Vegetation Association(s)	Clearing Description	Vegetation Condition	Comments
Vegetation Association 36 described as Shrublands; thicket, acacia-casuarina alliance.	Clearing of up to 5.43 ha of native vegetation for the purpose of road widening and upgrades on Great Eastern Hwy.	Excellent – Degraded (EPA, 2016).	Vegetation description and condition determined from biological survey (GHD, 2016).
Vegetation Association 1065 described as a mosaic of Shrublands; Medium woodland; wandoo & gimlet / York gum & *Eucalyptus sheathiana* mallee scrub.			

Table 5. Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Veg Assoc No. 36	**Statewide**	495,430.67	226,242.18	46%	6%
	IBRA Bio region Avon Wheatbelt (AVW)	300,996.97	72,745.12	24%	3%
	IBRA Sub-region Merredin (AVW01)	300,996.97	72,745.12	24%	3%
	Local Government Authority Shire of Westonia	21,987.61	5,641.54	26%	7%
	Local Government Authority Shire of Yilgarn	73,850.98	39,909.36	54%	6%
Veg Assoc No. 1065	**Statewide**	862.67	434.52	50%	44%
	IBRA Bio region Avon Wheatbelt (AVW)	862.67	434.52	50%	44%
	IBRA Sub-region Merredin (AVW01)	862.67	434.52	50%	44%
	Local Government Authority Shire of Westonia	837.33	428.85	51%	45%

5 ASSESSMENT AGAINST THE TEN CLEARING PRINCIPLES

In assessing whether the proposed clearing is likely to have a significant impact on the environment, the project was assessed against the ten Clearing Principles (*Environmental Protection Act 1986*, Schedule 5).

Each principle has been assessed in accordance with DWER's 'A Guide to the Assessment of Applications to Clear Native Vegetation' and other relevant CPS Decision Reports prepared by DWER.

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

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

Comments	**Proposed clearing is at variance to this Principle**
	The proposal requires the clearing of up to 5.43 ha of native vegetation within a proposal area of 15.26 ha. Approximately 60% of the proposal area is already cleared; the remaining areas of native vegetation are predominantly in 'Excellent' condition, with minor areas in 'Excellent to Very Good' and 'Degraded' condition (GHD, 2016; MRWA, 2020a). The proposal area comprises the following five vegetation types: • *Allocasuarina* tall shrubland (VT03); • *Eucalyptus sheathiana* open mallee forest (VT04). • *Eucalyptus capillosa* subsp. *capillosa* open forest (VT05); • *Allocasuarina spp*. and *Acacia acuminata* tall shrubland (VT13); • *Eucalyptus salubris* open forest over *Melaleuca sheathiana* tall shrubland (VT14). Two *Eucalyptus*-dominated woodland vegetation types (VT05 and VT14) were inferred to align with the EPBC Act-listed Eucalypt Woodlands TEC and State equivalent Eucalypt Woodlands PEC (GHD, 2016). Follow-up targeted mapping conducted against the diagnostic criteria and condition thresholds outlined in DotE (2015) indicates 1.45 ha of this ecological community occurs within the proposal area (Astron, 2020). Aerial imagery indicates vegetation within the proposal area is contiguous with extensive areas of Eucalypt woodlands in Nature Reserve R 18583. This has been confirmed by a targeted TEC/PEC assessment of the reserve, which mapped approximately 221.83 ha of Eucalypt Woodlands TEC and PEC in five large patches either side of GEH (Astron, 2020). The area of TEC and PEC proposed to be cleared represents approximately 0.6% of the total extent found in Nature Reserve R 18583. The clearing will be restricted to the edges of these patches along the existing road corridor. Considering the clearing will impact less than 1% of the total extent found in the surrounding area, the proposed clearing is not likely to significantly impact this community. According to available databases, two other PECs are known to occur within 20 km of the proposal area: • Red Morrel Woodlands of the Wheatbelt (P1); • Gimlet Woodlands of the Wheatbelt (P3). These communities have not been recorded in the proposal area (Astron, 2020).

DBCA TEC and PEC shapefiles also identified an additional PEC occurring in the local area; Salmon Gum Woodlands of the Wheatbelt (P3). This PEC is preliminary only and not listed on DBCA's current PEC list (DBCA, 2020a). DBCA has advised that this community forms a component of the overarching EPBC Act-listed Eucalypt Woodlands TEC and is under consideration for listing as a separate PEC (pers. comm. DBCA Species and Communities Branch, 2020).

For the purposes of the Astron (2020) TEC/PEC assessment, the community was mapped where Salmon Gum Woodlands occur in areas considered representative of the Eucalypt Woodlands TEC and PEC and have a woodland structure dominated by Salmon Gum. Approximately 83 ha of Salmon Gum dominated woodlands were mapped within the survey area, including 0.67 ha in the proposal area.

A total of 525 plant taxa are known to occur within the study area, including five Threatened flora species and 18 Priority flora species (DBCA, 2020b). A number of flora and vegetation surveys have been conducted within and surrounding the proposal area, resulting in three Priority flora being recorded within the proposal area:

- *Acacia ancistrophylla* var. *perarcuata* (P3);
- *Acacia crenulata* (P3);
- *Acacia filifolia* (P3).

No Threatened flora species have been recorded in the proposal area (Ecologia, 2020).

Acacia ancistrophylla var. perarcuata is a rounded or obconic shrub that grows on red sand, clay loam or loam, on undulating plains (WA Herbarium, 1998-). The species occurs across a range of approximately 550 km, comprising the Avon Wheatbelt, Coolgardie and Mallee IBRA bioregions. A total of 171 individuals from 69 locations have been recorded within the proposal area (Ecologia, 2020). The species was found growing in a variety of habitat types, including vegetation types VT03, VT04, VT05 and VT14.

Various surveys have recorded *Acacia ancistrophylla var. perarcuata* throughout surrounding vegetation in Nature Reserve R 18583. Targeted searches for this species have recorded 1,515 individuals adjacent to GEH and in vegetation to the south of GEH outside of the proposal area (Astron, 2018; GHD, 2016).

Acacia crenulata is a bushy shrub or tree associated with rocky rises, granite outcrops or breakaways (WA Herbarium, 1998-). This species occurs across a range of approximately 250 km, comprising the Avon Wheatbelt and Coolgardie IBRA bioregions. A total of 55 individuals from 25 locations have been recorded within the proposal area (Ecologia, 2020). This species was found growing in vegetation types VT03, VT013 and VT14.

Targeted searches for *Acacia crenulata* along GEH recorded 209 individuals outside of the proposal area in two populations (GHD, 2016; MRWA, 2020b). This species was also opportunistically recorded at 15 locations throughout Nature Reserve R 18583 (but outside the proposal area) totalling 82 individuals (Astron, 2020). Although these populations were recorded opportunistically and were not systematically searched for, this species was observed to be more widespread across the survey area (Astron, 2020).

Acacia ancistrophylla var. perarcuata and *Acacia crenulata* do not appear to be highly restricted in distribution or abundance, and considering the extent of suitable habitat outside the proposal area in Nature Reserve R 18583, the proposed clearing is not likely to significantly impact the conservation of these species.

One individual of *Acacia filifolia* occurs in the proposal area (Ecologia, 2020). This species was not recorded in other surveys undertaken in surrounding vegetation. Within the study

	area, this species has been previously recorded in four locations, including 900 m south of GEH in Nature Reserve R 18583 (GIS Database). More broadly, this species is known to occur across a range of approximately 380 km in the Avon Wheatbelt, Coolgardie and Geraldton Sandplains IBRA bioregions with 52 records in FloraBase ranging in frequency from rare to common (WA Herbarium, 1998-). Main Roads (2020b) identified the one *Acacia filifolia* record during a site inspection and searched surrounding vegetation outside of the proposal area. No additional individuals were found. Potential impacts to this species will be minimised by avoiding clearing this individual and the surrounding 10 m of vegetation. Specific management controls for this species are outlined in the Vegetation Management Plan (Appendix 1). *Acacia subrigida* (P2) was recorded in the proposal area by GHD (2016). Two searches for this species did not locate this record again and found no evidence of *Acacia subrigida* occurring in the proposal area (Ecologia, 2020; Main Roads, 2020b). This species is not known to occur in the study area and the nearest record of *Acacia subrigida* is over 250 km north-west of the proposal area (GIS Database). The likelihood of *Acacia subrigida* occurring in the proposal area is considered low (Ecologia, 2020). Considering a targeted search conducted during the optimum flowering time did not record this species, the GHD (2016) record was potentially a misidentification. A Level 1 fauna assessment of GEH between Merredin and Southern Cross, which includes the proposal area, recorded 76 fauna species, consisting of 62 birds, 10 mammals, 3 reptiles and 1 amphibian (GHD, 2016). One fauna species of conservation significance in the proposal area; one Malleefowl (*Leipoa ocellata*) was recorded as road kill next to GEH. There are also historical records of this species occurring in Nature Reserve R 18583 (GIS Database). There was no evidence of Malleefowl breeding at the time of the survey (GHD, 2016). Vegetation within the proposal area is potentially suitable for Malleefowl breeding, however the likelihood of Malleefowl using this vegetation is considered low, as discussed in principle (b). Six suitable DBH trees for black cockatoos are present within the proposal area, but none of these contained suitable breeding hollows for the Threatened Carnaby's Cockatoo. The proposal area contains suitable foraging habitat for Carnaby's Cockatoo, however no evidence of the species has been recorded in the area (GHD, 2016; Main Roads, 2020). Noting the biological values of the proposal area are well represented in adjacent vegetation located in Nature Reserve R 18583, the proposed clearing is not likely to have a significant impact on flora, fauna or ecological communities. Nonetheless, based on the above, the proposed clearing is at variance to this principle.
Methodology	Astron (2018) Astron (2020) DBCA (2020a) DBCA (2020b) DotE (2015) Ecologia (2020) GHD (2016) Main Roads (2020a) Main Roads (2020b) WA Herbarium (1998-) GIS Database: - Threatened and Priority Ecological Communities (Buffered) - Threatened and Priority Fauna

	- Threatened and Priority Flora (DBCA) - Threatened and Priority Flora (WA Herbarium)

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

Comments	**Proposed clearing is not likely to be at variance to this Principle**
	Three habitat types have been recorded in the proposal area, Allocasuarina tall shrublands, Eucalypt woodlands, and Mixed Shrublands (GHD, 2016). Vegetation of the proposal area is contiguous with extensive areas of native vegetation in Nature Reserve R 18583 (1,059 ha), and these habitat types are considered well represented in the local area. GHD (2016) also recorded Highly modified areas as providing very little habitat value to fauna. A desktop search has identified seven conservation significant species known to occur in the study area, and six species that may occur (DAWE, 2020; DBCA, 2020b). The following species may be present in the proposal area based on the habitats present: • Carnabys Cockatoo (*Calyptorhynchus latirostris* – Endangered) • Shield-backed trapdoor spider (*Idiosoma nigrum* – Endangered); • Chuditch (*Dasyurus geoffroii* – Vulnerable); • Malleefowl (*Leipoa ocellata* – Vulnerable); • Peregrine falcon (*Falco peregrinus* – Other specially protected fauna); • Fork tailed swift (*Apus pacificus* subsp. *pacificus* – Migratory); and • Tree-stem trapdoor spider (*Aganippe castellum* – P4). A Level 1 fauna assessment over the proposal area recorded one conservation significant species in the proposal area; one Malleefowl (*Leipoa ocellata*) was recorded as road kill next to GEH (GHD, 2016). There are also historical records of this species occurring in Nature Reserve R 18583 (GIS Database). There was no evidence of breeding recorded at the time of the survey, and subsequent inspections by Main Roads has not identified any breeding activity within the proposal area. While the biological survey (GHD, 2016) indicated there was potential for Malleefowl to utilise the habitat within the proposal area for breeding, the likelihood of this is considered to be very low given: • no evidence of breeding activity (i.e. mounds) was recorded during the biological survey and a subsequent site inspection by Main Roads (2020a); • clearing comprises a relatively thin strip of vegetation along either side of the GEH where noise and vibration effects would deter breeding activity; • feral predators such as the red fox and cat occur in the proposal area; • there are extensive areas of similar habitat in the surrounding area. The proposal area occurs towards the eastern edge of the modelled distribution of Carnaby's Cockatoo (DSEWPaC, 2012). The Eucalypt woodlands habitat type provides suitable breeding and foraging habitat and the Mixed shrublands habitat type may also provide foraging habitat in the form of isolated foraging species (GHD, 2016). There are six suitable DBH trees in the proposal area with no suitable hollows for breeding (GHD, 2016; MRWA, 2020a).

	There was no evidence of breeding or foraging activity in the proposal area or surrounding vegetation (GHD, 2016). Carnabys Cockatoo is not likely to be present east of Merredin based on the estimated current distribution of the species (EPA, 2019). This is supported by the absence of historical records in the study area (GIS Database). The nearest record of Carnabys Cockatoo is approximately 40 km west of the proposal area, and the nearest confirmed breeding record is approximately 95 km west of the proposal area (pers. comm. WA Museum, 2020). Carnabys Cockatoo is therefore unlikely to utilise vegetation in the proposal area for habitat. There is also at least 221 ha of Eucalypt woodlands surrounding the proposal area that provides similar habitat (Astron, 2020). Chuditch may use all habitats present in the proposal area on an opportunistic basis for feeding, breeding and/or dispersal (GHD, 2016). The fauna survey did not record any evidence of Chuditch along GEH. The habitats in the proposal area form less than 1% of a large remnant of native vegetation in Nature Reserve R 18583, and the proposed clearing will not substantially reduce the habitat available in the local area. Peregrine Falcon and Fork-tailed Swift are highly mobile species with wide distributions and would not be reliant on vegetation in the proposal area for habitat. For Shield-backed Trapdoor Spider in the Wheatbelt, habitat critical to the species is identified as open York gum (*Eucalyptus loxophleba*), Salmon gum (*E. salmonophloia*) and Wheatbelt Wandoo (*E. capillosa*) woodland, where Jam (*Acacia acuminata*) forms a sparse understorey in heavy clay soils (ACC, 2007a). Preferred habitat for this species is not present as the Eucalypt woodland vegetation types occurring in the proposal area do not contain a Jam understory, and the soils are not described as heavy clay (GHD, 2016). The Tree-stem trapdoor spider typically occupies flood-prone depressions and flats that support myrtaceous shrub communities, in particular those areas supporting Broombush (*Melaleuca uncinata*) and Sheoaks (such as *Allocasuarina acutivalvis*) in sandy loam soils (ACC, 2007b). The proposal area may provide suitable habitat in the form of Mixed shrublands and *Allocasaurina* tall shrublands. There are extensive areas of similar habitat for this species outside of the proposal area. While the proposal area may provide some habitat value for fauna, including for conservation significant species, given the clearing area is relatively small compared with the extent of remnant vegetation in the surrounding area, and the linear nature of the clearing, vegetation within the proposal area is not likely to form significant habitat for fauna. Based on the above, the proposed clearing is not likely to be at variance to this principle.
Methodology	ACC (2007a) ACC (2007b) Astron (2020) DAWE (2020) DBCA (2020b) DSEWPaC (2012) EPA (2019) GHD (2016) MRWA (2020a) GIS Database: - Threatened and Priority Fauna

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

Comments	Proposal is not likely to be at variance to this Principle
	Five Threatened flora species have been previously recorded in the study area, with an additional seven species potentially occurring (DAWE, 2020; GIS Database). None of these records occurs in the proposal area. Based on the habitats present, the following species have the potential to occur in the proposal area (Ecologia, 2019): - *Eremophila resinosa*; - *Eremophila viscida*. A targeted flora survey conducted in the proposal area along GEH did not record these species, or any other Threatened flora occurring in the proposal area (Ecologia, 2020). A small part of the proposal area near the Perth-Kalgoorlie Rail Line is outside of the targeted flora survey area. This area is sparsely vegetated from historical disturbance and is in a degraded condition (MRWA, 2020a). The likelihood of Threatened flora occurring here is considered low. Based on the above, the proposed clearing is not likely to be at variance to this principle.
Methodology	DAWE (2020) Ecologia (2019) Ecologia (2020) MRWA (2020a) GIS Database: - Threatened and Priority Flora (DBCA) - Threatened and Priority Flora (WA Herbarium)

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

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

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

Comments	**Proposed clearing is at variance to this Principle**

The proposal is located in the Avon Wheatbelt IBRA region, of which approximately 19% of pre-European vegetation extent remains (Government of Western Australia, 2019). Approximately 19% of remnant vegetation remains in the study area (GIS Database).

The vegetation of the proposal area has been broadly mapped as the following pre-European vegetation associations:

36: Shrublands; thicket, acacia-casuarina alliance.

1065: Mosaic of Shrublands; Medium woodland; wandoo & gimlet / York gum & *Eucalyptus sheathiana* mallee scrub.

The National Objectives and Targets for Biodiversity Conservation recognise that the retention of 30 per cent or more of the pre-clearing extent of each ecological community is necessary if Australia's biological diversity is to be protected (Commonwealth of Australia, 2001). With regard to the two broad vegetation associations mapped within the proposal area, there is less than 30% of vegetation association 36 extent remaining in the bioregion and subregion, and within the Shire of Westonia. Vegetation association 1065 retains approximately 50% of pre-European extent at all scales.

Pre-European Vegetation Association	Scale	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Veg Assoc No. 36	**Statewide**	495,430.67	226,242.18	46%	6%
	IBRA Bio region Avon Wheatbelt (AVW)	300,996.97	72,745.12	24%	3%
	IBRA Sub-region Merredin (AVW01)	300,996.97	72,745.12	24%	3%
	Local Government Authority Shire of Westonia	21,987.61	5,641.54	26%	7%
	Local Government Authority Shire of Yilgarn	73,850.98	39,909.36	54%	6%

Veg Assoc No. 1065	**Statewide**	862.67	434.52	50%	44%
	IBRA Bio region Avon Wheatbelt (AVW)	862.67	434.52	50%	44%
	IBRA Sub-region Merredin (AVW01)	862.67	434.52	50%	44%
	Local Government Authority Shire of Westonia	837.33	428.85	51%	45%

The following vegetation types have been recorded in the proposal area:

- *Allocasuarina* tall shrubland (VT03);
- *Eucalyptus sheathiana* open mallee forest (VT04).
- *Eucalyptus capillosa* subsp. *capillosa* open forest (VT05);
- *Allocasuarina spp*. and *Acacia acuminata* tall shrubland (VT13);
- *Eucalyptus salubris* open forest over *Melaleuca sheathiana* tall shrubland (VT14);

The vegetation is predominantly in an excellent condition, with small areas in excellent to very good condition and degraded condition.

With regard to pre-European vegetation association 36, there is approximately 11,000 ha of this vegetation association remaining in the surrounding 20 km according to remnant vegetation mapping (GIS Database). Vegetation types VT03 and VT13 are considered most representative of vegetation association 36. Approximately 3.41 ha of VT03 and VT13 occurs in the proposal area, or 0.03% of the remaining extent in the study area.

The proposal area forms part of a large patch of remnant vegetation associated with Nature Reserve R 18583, which is approximately 1,059 ha in area. The reserve is connected to other large patches of remnant vegetation to the north-west, east and south-east, including unnamed nature reserves R 28562 and R 16000 (GIS Database). As the proposed clearing is relatively small in scale and linear in nature, and limited to vegetation along an existing road corridor and degraded areas near the Perth-Kalgoorlie Rail Line, the proposed clearing will not remove or substantially decrease any linkages between patches of remnant vegetation.

The proposal area occurs in a relatively diverse area containing conservation significant flora and ecological communities, as discussed under principle (a). As discussed under principle (h), some of the vegetation is currently reserved for conservation. Although the clearing will be limited to vegetation within three to five metres from the existing cleared road formation, the vegetation is considered to form part of a significant remnant in an extensively cleared landscape.

	Based on the above, the proposed clearing is at variance to this principle. Impacts to remnant native vegetation as a result of the proposal will be managed by the implementation of an offset.
Methodology	Government of Western Australia (2019) Commonwealth of Australia (2001) GIS Database: - Aerial Imagery - DAFWA Remnant Vegetation - DBCA Managed Lands - Pre-European Vegetation

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

Comments	**Proposed clearing is at variance to this Principle**
	One minor non-perennial watercourse intersects the proposal area (GIS Database). Although no vegetation within the proposal area has been mapped as riparian (GHD, 2016), it is considered the proposal area contains a small area (~0.01 ha) of vegetation growing in association with a watercourse. The area proposed to be cleared is minor in scale and nature, with the clearing proposed not expected to impact the values of this watercourse. There are no wetlands in the vicinity of the proposal area. Based on the above, the proposed clearing is at variance to this principle.
Methodology	GHD (2016) GIS Database: - Hydrology South

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

Comments	**Proposed clearing is not likely to be at variance to this Principle**
	A variety of soils have been recorded in the proposal area, including sandplains, sandy loams, and loam clays (GHD, 2016). The proposal area gently rises in elevation from west to east (<1%). Natural Resource Management Soil Systems and CSIRO risk mapping indicates the soils of the proposal area have generally low risk of land degradation, with a moderate risk of wind erosion (GIS Database). Given the linear nature of the clearing and sealing of areas for road construction, the proposed clearing is not likely to lead to an appreciable increase in land degradation. Standard erosion and dust management control measures will be implemented during construction to reduce the incidence of wind erosion. Based on the above, the proposed clearing is not likely to be at variance to this principle.
Methodology	GHD (2016). GIS Database: - Contours – WB North 25k – 100k - CSIRO Acid Sulphate Soils risk mapping - Nature Resource Management SLIP soil systems

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

Comments	Proposed clearing is at variance to this Principle
	The proposal area intersects unnamed class-C nature reserve R 18583, which is vested in the Conservation and Parks Commission of WA for the purpose of conservation of flora and fauna. The reserve is approximately 1,059 ha in area, and is managed by the Department of Biodiversity, Conservation and Attractions (DBCA). The proposal area is marginally wider than the current road reserve to facilitate the widening of GEH. Main Roads has initiated the transfer of land from nature reserve into road reserve, which will result in widening the road reserve by 20 m either side of GEH. Main Roads has also identified areas of mixed tenure adjacent to R 18583, such as Unallocated Crown Land (UCL) and redundant road reserve, to transfer into the conservation estate. The inclusion of this land will result in a net gain in conservation area. DBCA and the Conservation and Parks Commission of WA have endorsed the proposed land transfer (see Attachment 1). The proposed clearing will occur prior to the land transfer being finalised, therefore an approval under DBCA's Disturbance Approvals System will be sought. Approximately 3.90 ha of native vegetation is proposed to be cleared within the current boundary of the nature reserve. As discussed in principle (a), the clearing will impact on priority flora and the Eucalypt Woodlands TEC and PEC. Additional surveys undertaken in Nature Reserve R 18583 have found that the priority flora species (*Acacia ancistrophylla var. perarcuata* and *Acacia crenulata*) are not restricted in distribution, and are found elsewhere throughout the reserve (Astron, 2020). A targeted Eucalypt Woodlands TEC/PEC assessment mapped 211 ha of the Eucalypt Woodlands community in Nature Reserve R 18583. The proposal area also includes a small, sparsely vegetated area approximately 60-160 m south of GEH near the Perth – Kalgoorlie Rail Line, which occurs in the nature reserve. This area is in degraded condition from historical clearing, with vegetation limited to isolated trees and shrubs (MRWA, 2020a). Considering the proposed clearing area accounts for less than 1% of Nature Reserve R 18583, the proposed clearing is unlikely to significantly impact on the environmental values of this reserve. The implementation of a Construction Environmental Management Plan (CEMP) will manage indirect impacts to the reserve. The CEMP will include management controls to prevent the introduction and spread of weeds, management of hydrocarbons, prevent soil erosion and ensure clearing is contained in the approved area. The proposed clearing will not impact on any linkages between Nature Reserve R 18583 and other reserves and patches of remnant vegetation in the local area. Based on the above, the proposed clearing is at variance to this principle.
Methodology	Astron (2020) MRWA (2020a) GIS Database: - DBCA Managed Lands

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

Comments	**Proposed clearing is not likely to be at variance to this Principle**
	Numerous minor non-perennial watercourses are located in the study area, including one minor drainage line that intersects the proposal area. The proposed clearing will only impact a very small area of the watercourse as part of works to upgrade the existing culvert. This activity is not expected to impact on surface water flows or quality. There are no Public Drinking Water Source Areas within or in close proximity to the proposal area (GIS Database). The proposed clearing of 5.43 ha of native vegetation along an existing major road is not likely to alter groundwater quality in the area. Based on the above, the proposed clearing is not likely to be at variance to this principle.
Methodology	GIS Database: - Hydrology South - PDWSAs

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

Comments	**Proposed clearing is not likely to be at variance to this Principle**
	The proposal area is situated in the Swan Avon – Yilgarn Catchment, which drains an area of approximately 58,360 km^2. The proposal area averages 350 mm of rainfall annually (BOM, 2020). The topography across the proposal area is gently undulating, with an average rise towards the east. The soils of the proposed area have a low risk of waterlogging and flooding (GIS Database). One minor non-perennial watercourse intersects the proposal area. Clearing at this location will be for the upgrade of an existing culvert, thereby maintaining the existing flow of the watercourse. The minor and linear nature of the clearing is unlikely to result in excessive levels of surface runoff that would increase the intensity or incidence of flooding. Based on the above, the proposed clearing is not likely to be at variance to this principle.
Methodology	BOM (2020) GIS Database: - DoW Catchments - Hydrology South - Nature Resource Management SLIP soil systems

6 ADDITIONAL ACTIONS REQUIRED

Table 5 summarises what further pre-clearing impact assessment and vegetation management 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. Where the clearing is at variance or may be at variance to Clearing Principle (f) and no other Clearing Principle, and the area of the proposed clearing is less than 0.5 hectares in size and the Clearing Principle (f) impacts only relate to: (i) a minor non-perennial watercourse(s); (ii) a wetland(s) classed as a multiple use management category wetland(s); and/or (iii) a wetland that is not a defined wetland; the preparation of an Assessment Report, as required by condition 6(e), is not required.	**Yes**	**1.** Submissions will be sought from relevant parties, including the LGA, in accordance with Condition 8 of CPS 818/15 published on the website. **2.** VMP has been completed, refer to Appendix 1. **3.** An offset proposal for approval by DWER is required where clearing is 'at variance'. The offset proposal must be approved prior to undertaking clearing of the area to which the offset is related.
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. The project involves clearing for temporary works (as defined by CPS 818).	**No**	No further action required.
4 a. Project is within Region that: - Has rainfall greater than 400mm and - Is South of the 26th parallel and - Works are in 'Other than dry conditions' and - Works have potential for **uninfested** areas to be impacted	**No**	Proceed with standard Vehicle and Plant management actions from PEMR's and Vehicle and Plant Hygiene Checklists

Impact of Clearing	Yes/No or NA	*Further Action Required*
4b. Does the proposed works require clearing within or adjacent to DBCA estate in non-dry conditions?	**No**	No further action required.
5. Main Roads has been notified by DWER or an environmental specialist that the area to be cleared is susceptible to a pathogen other than dieback	**No**	No further action required.
6. The vegetation within the area to be cleared and/or the surrounding vegetation in a good or better condition and weeds 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. The proposal includes implementation of a CEMP, which will prevent the spread of weeds to adjacent areas of native vegetation.

7 STAKEHOLDER CONSULTATION

Main Roads has undertaken stakeholder consultation in accordance with CPS 818/15 Condition 8. This has included publishing the CAR on the Main Roads website for a period of 21 days.

Table 6 provides a summary of stakeholder consultation undertaken to date.

Table 6. Summary of stakeholder consultation undertaken to date

Stakeholder	Date	Comments
DBCA Regional Manager Wheatbelt	27/03/2019	Discussed the larger Walgoolan to Southern Cross upgrades and land requirements.
DBCA Land Unit Coordinator	2018 - ongoing	MRWA has worked closely with DBCA Land Services to facilitate the transfer of tenure. Approximately 20 m either side of the GEH road reserve will be transferred from Nature Reserve into road reserve to accommodate widening GEH. The Conservation and Parks Commission of WA has endorsed this.
DWER Drainage and Waterways Branch	16/02/2021	No comment.

No submissions were received via the Main Roads website.

8 VEGETATION MANAGEMENT

Main Roads will avoid clearing native vegetation where possible. Where clearing cannot be avoided, then this clearing is kept to a minimum. A Vegetation Management Plan (VMP) has been developed to manage and minimise vegetation clearing for the project (refer to Appendix 1).

9 REFERENCES

ACC (2007a) Shield-backed Trapdoor Spider (*Idiosoma nigrum*) Conservation Plan. Avon Catchment Council, Western Australia.

ACC (2007b) Tree-stem Trapdoor Spider (*Aganippe castellum*) Conservation Plan No. ##. Avon Catchment Council, Western Australia.

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.

Astron (2020) Great Eastern Highway Upgrade SLK 302.2 – 306.65 Threatened and Priority Ecological Community Assessment, October 2020. Report prepared by Main Roads WA, by Astron Environmental Services.

BOM (2020) Climate Averages for Australian Sites – Bodallin monitoring site – Available online from http://www.bom.gov.au/climate/data/index.shtml Accessed 02/11/2020.

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

DAWE (2020) Protected Matters Search Tool. Department of Agriculture, Water and the Environment, Canberra. Available from http://www.environment.gov.au/epbc/protected-matters-search-tool. Accessed 28/10/2020.

DBCA (2020a) Priority Ecological Communities for Western Australia Version 30 (28 July 2020). Species and Communities Program, Department of Biodiversity, Conservation and Attractions.

DBCA (2020b) NatureMap: Mapping Western Australia's Biodiversity. Department of Parks and Wildlife. https://naturemap.dpaw.wa.gov.au/. Accessed 01/11/2020.

DEC (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 Environmental Regulation.

DotE (2015) Approved Conservation Advice (including listing advice) for the *Eucalypt Woodlands of the Western Australian Wheatbelt*. Department of the Environment, Canberra.

DSEWPaC (2012) EPBC Act referral guidelines for three threatened black cockatoo species. Department of Sustainability, Environment, Water, Population and Communities, Canberra.

DWER (2019) Native Vegetation Clearing Permits. Application, assessment, and management requirements under Part V Division 2 of the Environmental Protection Act 1986. Department of Water and Environmental Regulation.

Ecologia (2019) Great Eastern Highway 302.2 – 306.65 SLK Desktop Assessment. Report prepared for Main Roads WA, by Ecologia Environment.

Ecologia (2020) Great Eastern Highway Walgoolan to Southern Cross Package 3: SLK 302.2 to 306.65 – 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.

EPA (2019) EPA Technical Report: Carnaby's Cockatoo in Environmental Impact Assessment in the Perth and Peel Region – Advice of the Environmental Protection Authority under Section 16(j) of the Environmental Protection Act 1986. Environmental Protection Authority, Perth.

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 (2011) WA Environmental Offset Policy. Perth Western Australia.

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

Government of Western Australia (2019) 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of December 2017. WA Department of Biodiversity, Conservation and Attractions, Perth. Available online from: https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics.

Main Roads WA (2020a) Site Inspection Report: Great Eastern Hwy SLK 302.2 – 306.65, 22 October 2020.

Main Roads WA (2020b) Site Inspection Report: Great Eastern Hwy between Walgoolan and Southern Cross, 23 January 2020.

Western Australian Herbarium (1998 -) *FloraBase* - The Western Australian Flora. Department of Biodiversity, Conservation and Attractions. Available online from: https://florabase.dpaw.wa.gov.au/. Accessed 02/11/2020.

10 APPENDICES

Appendix	Title
Appendix 1	Vegetation Management Plan

Appendix 1: Vegetation Management Plan

GREAT EASTERN HWY UPGRADE PACKAGE 3 (SLK 302.2 – 306.65)

Purpose and Scope

Main Roads has prepared this Vegetation Management Plan (VMP) for the purpose of managing native vegetation clearing impacts associated with the proposal.

Main Roads proposes to upgrade a 4.45 km section of GEH between the town sites of Carrabin and Bodallin. The upgrade will comprise the following components:

- Widen GEH to an 11 m seal on an 11 m wide formation;
- Pavement overlay, rehabilitation or reconstruction;
- New road delineation, signage and line marking, including a 1 m wide centre line;
- Upgrade drainage infrastructure and improve road drainage, especially around Bridge 1575 where runoff is causing erosion;
- Improve intersection with Smyth Rd;
- Improve safety features around Bridge 1575.

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

Action

Project Specific Environmental Management Requirements are contained in Table 1.

Appendix 2.1 references the standard Principal Environmental Management Requirements (PEMRs) (Tables 1 to 7) that will be utilised for all projects that involve clearing to avoid, mitigate and manage the environmental impacts of the project.

Timeframes

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

Responsibilities

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

Appendix 1.1: Vegetation Management

VMP Requirement	Standard Management Action	Specific Management Action
Clearing	Refer to Table 1: Clearing PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan • Specification 301 Vegetation Clearing and Demolition • Environment Measurement and Evaluation Checklist (for release of HOLD POINTS) Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	• Demarcate the Limits of Vegetation Clearing boundary prior to clearing by qualified surveyor. • The pegged clearing line will be inspected by the MRWA Environment Officer prior to clearing commencing. • The location of *Acacia filifolia* and surrounding 10m of vegetation to be demarcated as a Special Environmental Area (SEA) and retained. • During clearing activities, conduct daily pre-start meetings with clearing crews to review and discuss approved clearing areas and controls.
Erosion and Sedimentation Control	Refer to Table 2: Erosion and Sedimentation Control PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable
Fauna	Refer to Table 3: Fauna PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable

VMP Requirement	Standard Management Action	Specific Management Action
Machinery and Vehicle Management	Refer to Table 4: Machinery and Vehicle Management PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable
Mulch and Topsoil Management	Refer to Table 5: Mulch and Topsoil Management • Specification 204 Environmental Management • Construction Environmental Management Plan • Specification 301 Vegetation Clearing • Specification 304 Revegetation and Landscaping Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable
Pegging and Flagging	Refer to Table 6: Pegging and Flagging PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan • Specification 301 Vegetation Clearing and Demolition Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable
Weed Management	Refer to Table 7: Weed Management PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable
Monitoring	• Specification 204 Environmental Management • Construction Environmental Management Plan • Superintendent's Contract Management Plan & Environmental Measurement and Evaluation Checklist. Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable
Auditing	• Specification 204 Environmental Management	Not Applicable

VMP Requirement	Standard Management Action	Specific Management Action
	• Superintendent's Contract Management Plan & Environmental Measurement and Evaluation Checklist. Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	

Principal Environmental Management Requirements (PEMR's)

Table 1: Clearing PEMR

STANDARD MANAGEMENT ACTIONS

STANDARD MANAGEMENT REQUIREMENTS
PRE WORKS 1. The Contractor must prepare, implement and maintain processes to ensure that the movement of all vehicles, plant and machinery does not occur outside of the Limits of Vegetation Clearing. This must include all turnaround areas. 2. The Contractor must minimise vegetation clearing and the area of disturbance on ground by utilising existing cleared areas where possible.
DURING WORKS 1. The Contractor must report any damage to vegetation beyond the Limits of Vegetation Clearing as an Environment Incident. 2. The Contractor must ensure Movements are confined to the Limits of Vegetation Clearing during the works 3. The Contractor must undertake the clearing in accordance with the Fauna PEMR.
POST WORKS 1. NIL

Table 2: Erosion and Sedimentation

PRE WORKS

1. The Contractor must develop, implement and maintain processes and procedures to ensure that:
   - The Contractor is responsive to and addresses incidents of erosion and sedimentation within and adjacent to the work areas.
   - Water and wind soil erosion is prevented within and adjacent to the works areas.
   - The sedimentation and siltation of watercourses located within and adjacent to the works area is prevented.
   - Sedimentation and siltation of drainage lines due to the removal of riparian vegetation is avoided, minimised and mitigated.
   - Loose surfaces and recently cleared areas are protected from wind and soil erosion.
   - Exposed soil working surfaces are minimised or protected from stormwater erosion.
   - Material such as gravel, crushed rock and excavated material is stockpiled away from drainage paths and covered to prevent erosion.
   - Water quality monitoring is undertaken when turbidity and sedimentation is an issue.

DURING WORKS

1. Implement, monitor and adhere to the sedimentation and erosion processes developed to address the requirements in the pre-works.

POST WORKS

1. If required, the Contractor must continue to monitor water quality until the turbidity/sedimentation dissipates.
2. The Contractor must ensure that disturbed areas are stabilised as soon as is practicable after construction activities are completed.

Table 3: Fauna

PRE WORKS

1. The Contractor must ensure that fauna management requirements are communicated to the crew undertaking the clearing works during the induction and pre-start meeting.
2. Where active nests, burrows or dens are identified, works must not proceed until the Contractor obtains the Superintendent's approval for the management of active nests, burrows or dens or adheres to the Superintendents advice.

DURING WORKS

1. The Contractor must undertake the clearing in the following manner to allow fauna to move out of the clearing area;
    i. Prior to the clearing activities commencing, use machinery to tap large trees with habitat hollows to encourage any animals to evacuate.
    ii. Undertake the clearing in one direction and towards areas of native vegetation to allow the animals to escape to adjacent habitat.
2. The Contractor must ensure that all onsite personnel undertake visual monitoring and are vigilant to the presence of fauna. Any sightings of fauna, including injury or fatality, must be reported as an Environmental Incident.
3. The Contractor must ensure that;
    i. No pets, traps or firearms are brought into the project area.
    ii. Fauna are not fed.
    iii. Fauna are not intentionally harmed or killed.
    iv. Fauna that venture into the work area are encouraged to leave in a manner that does not harm the animal or operator (loud noise, slowly approaching in a vehicle etc.).
4. The Contractor must ensure that in the event that sick, injured or orphaned native wildlife are located on the project site, the WILDCARE Helpline ((08) 9474 9055) will be contacted for assistance. The Contractor must maintain records of any animal taken to a wildlife carer.

POST WORKS

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

Table 4: Machinery and Vehicle Management

PRE WORKS

1. The Contractor must ensure that all areas associated with the storage, parking, servicing, wash down and refuelling of all vehicles, plant and machinery are located within the Limits of Clearing, or in an existing cleared area, as approved by the Superintendent.
2. The Contractor must ensure that all vehicles, machinery and plant are clean on entry (i.e. free of all soil and vegetation material) and comply with the requirements of 204.B.32.
3. The Contractor must ensure that vehicle servicing and refuelling will be undertaken at designated areas approved by the Superintendent.
4. The Contractor must ensure that all staff are suitably qualified and competent to undertake works, especially refuelling activities.

DURING WORKS

1. The Contractor must maintain records of checking that all vehicles, machinery and plant are clean on entry.

POST WORKS

Table 5: Mulch and Topsoil Management

PRE WORKS

1. The Contractor must ensure that the movement of soil and vegetation is only undertaken in dry conditions unless otherwise approved and / or directed by the Superintendent.
2. The Contractor must ensure that poor quality topsoil and mulched vegetation does not contaminate the good quality topsoil and vegetation.

DURING WORKS

1. The Contractor must ensure that all machinery used in the removal of weed-infested topsoil must be cleaned down before and between operations to prevent the introduction and spread of weeds.
2. The Contractor must ensure the movement of large equipment over topsoil materials is avoided to minimise compaction.
3. The Contractor must ensure that Dieback and weed infected topsoil and mulch vegetation is handled separately to minimise the risk of spreading dieback and weed species across the site and stockpiles.
4. The Contractor must ensure that stockpiling operations must occur in a manner to ensure that the properties of the topsoil are not degraded and the topsoil made unsuitable for use in revegetation.

POST WORKS

Nil

Table 6: Pegging and Flagging

PRE WORKS

1. Pegging must be done in accordance with the requirements detailed in Specification 301.
2. The Contractor must clearly communicate, either at the pre-start meeting or equivalent, to the crew undertaking the clearing works, through clear maps and other additional means, what the pegging represents.

DURING WORKS

1. The Contractor must peg the Limits of Clearing by PINK flagging tape.
2. The Contractor must peg/demarcate vegetation proposed to be retained is demarcated by WHITE flagging tape.
3. The Contractor must ensure that the vegetation demarcated with PINK and WHITE flagging tape is consistent with the approved clearing areas.

POST WORKS

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

Table 7: Weed Management

PRE WORKS

1. The Contractor must remove or kill any weeds growing in project area that are likely to spread and result in environmental harm to adjacent areas of native vegetation that are in good or better condition.
2. The Contractor must develop, implement and maintain procedures to identify and control declared and invasive weed species within the Contract areas, to the satisfaction of the Superintendent.
3. The Contractor must prepare a weed control program, for nominated weed species for control and disposal, to the satisfaction of the Superintendent.
4. The Contractor must undertake weed management in stockpiles as directed by the Superintendent.

DURING WORKS

1. The Contractor must implement the weed control procedures and management plan and record and manage records of its implementation.

2. The Contractor must treat nominated weed infestations as many times as necessary to control and eradicate the weed species in accordance with the approved weed control program
3. The contractor must ensure that no known weed, pest or disease-affected soil, mulch, fill or other material is brought into the Site.

POST WORKS

1. The relevant Vegetation Maintenance Record Sheets available at: https://www.mainroads.wa.gov.au/BuildingRoads/Contracting/Pages/ReportingForms.aspx must be completed and sent to the Superintendent.