Clearing Assessment Report – CPS 818

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Great Eastern Highway Upgrade Ghooli Stage 1

August 2022

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Contents

Amendments

Report Compilation & Review	Name and Position	Document Revision	Date
Author:	[RETRACTED] GHD Environmental Scientist	Rev A	December 2021
Reviewer:	[RETRACTED]GHD Senior Environmental Scientist [RETRACTED]GHD Technical Director	Rev A	December 2021
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Author:	[RETRACTED]GHD Environmental Scientist [RETRACTED]GHD Senior Environmental Scientist	Rev1	August 2022
Reviewer:	[RETRACTED]GHD Technical Director	Rev 1	August 2022

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).

Main Roads Western Australia (Main Roads) Goldfields Esperance Region is proposing to upgrade an approximate 11 km section of the Great Eastern Highway (GEH) from Straight Line Kilometre (SLK) 378.23 – 395 (the Proposal). The Proposal has progressed to detailed design and therefore this document assesses the environmental impact of native vegetation clearing within a 33.44 hectare (ha) Impact Area.

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, and the strategies used to manage vegetation clearing.

2 SCOPE

2.1 Proposal Scope

Proposal Name: Great Eastern Highway Upgrade Ghooli Stage 1.

Proposal Purpose / Components: The Proposal will involve the upgrade of GEH between SLK 378.23 – 395. The upgrade is required as the road is currently in poor condition and is a potential safety hazard. The Proposal comprises the following components:

- Widening formation to 11 metres (m) with 11 m seal (two x 3.5 m traffic lanes, two x 2 m sealed shoulders),
- Reconstruction and overlay of the pavement along the existing alignment,
- Correction and realignment of one horizontal curve at SLK 383,
- Removal of some crests and dips by cutting the crests and filling up the depressions on this section of highway,
- Removal and replacing of culverts and fixing table drains to meet drainage requirements,
- Upgrade of intersections to meet restricted access vehicle (RAV) requirements,
- Tie-in to intersections, private property access and all rest areas/parking bays within the DE,
- Extension of existing culverts where required due to formation widening,
- Sealing of the rest area at SLK 387.

The proposed clearing undertaking using CPS 818 is: Up to 14.78 ha of native vegetation is proposed to be cleared within the Impact Area.

The proposed temporary clearing undertaking using CPS 818 is: Nil.

Proposal Location(s): GEH between SLK 378.23 – 395, within the Shire of Yilgarn, Western Australia, as shown in Figure 1. The Proposal is located in the Goldfields Esperance Region between Ghooli and Yellowdine.

2.2 Assessment Report Scope

The assessment area, see Figure 2, is confined to a local area of a 10 km radius surrounding the Impact Area and represents the area used for desktop searches.

Figure 1. Ghooli Stage 1 Impact Area

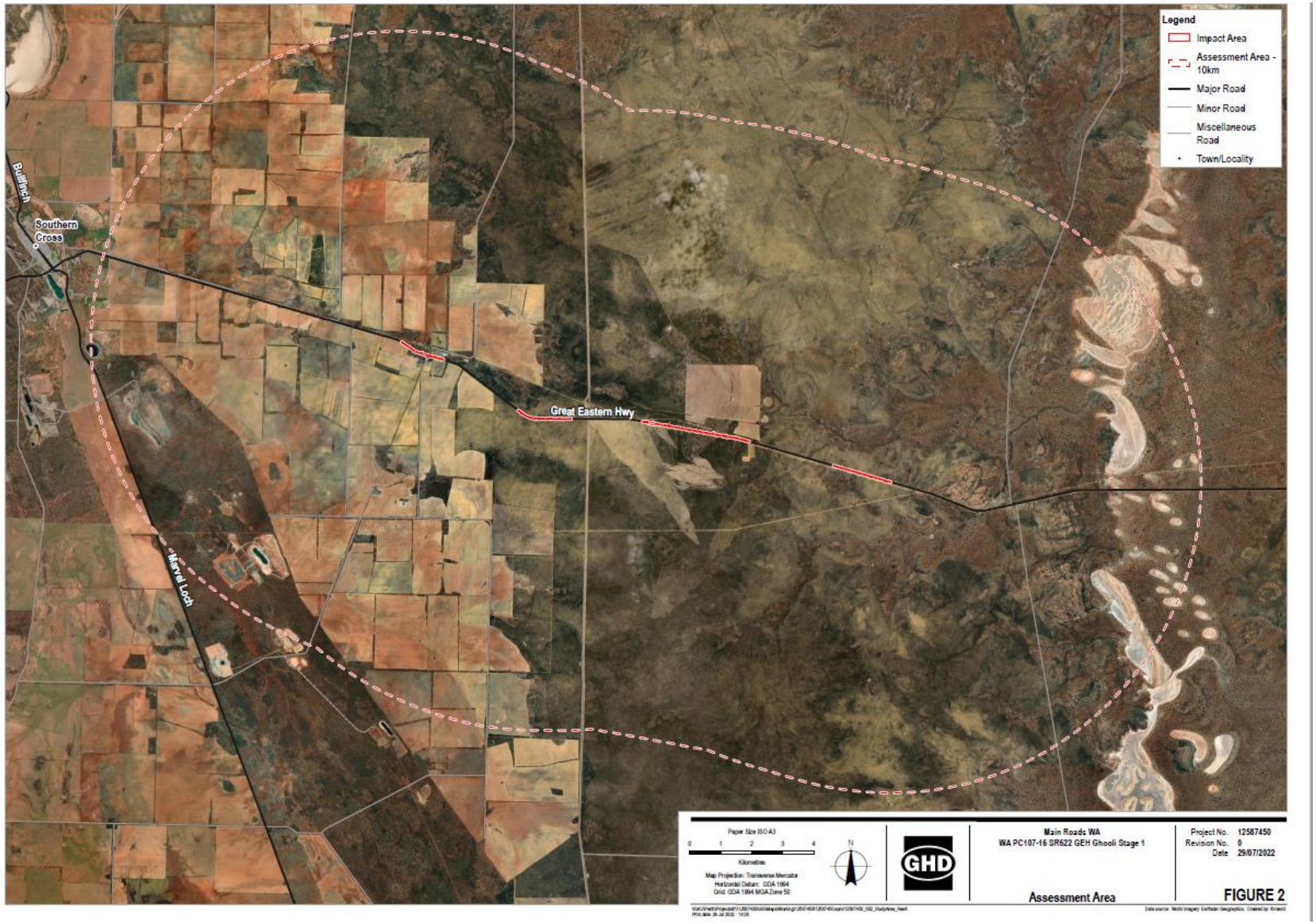

Figure 2. Ghooli Stage 1 Assessment Area

2.3 Alternatives to Clearing

A Project Environmental Risk Assessment (PERA) and Clearing Assessment Report (CAR) were completed in May 2022 (GHD 2022a, GHD 2022b) which assessed a wider development envelope to accommodate the Proposal design as it progressed to a detailed stage. As the detailed design has evolved it has been modified to reduce impacts to environmental values, specifically significant flora individuals and supporting habitat.

The Proposal has been designed to reduce clearing to the minimum necessary to enable construction while achieving the safety outcomes. The historically narrow road reserve in this area has had to be widened to allow the safety improvements to be implemented, so every endeavour has been made to minimise land take. Barriers and kerbing are not appropriate in this area due to the high cost and low safety improvements.

Laydown areas and site facilities will be located in areas already cleared.

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

The design and management measures implemented to avoid and minimise the clearing impacts by 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
Steepen batter slopes	The design has sought to reduce earthworks as much as possible and to minimise earthworks (fill height/cut depth). The majority of the battering for road improvement has been restricted to existing cleared areas. In areas where road geometry improvement is required (SLK 390) and upgrade of the existing parking bay at SLK 387.1, clearing of vegetation will be required.
Installation of safety barriers	Clearing of vegetation and ground disturbance has been maintained within the existing disturbance footprint as much as possible. Safety barriers were not applicable to the design.
Alignment to one side of existing road	The Impact Area extends west to east along the GEH, and follows the existing road. As the Impact Area currently comprises thin strips of vegetation adjacent to the existing highway, aligning the road to one side of the existing road may result in more significant impacts than clearing a smaller amount on either side of the road.
Alternative alignment to follow existing road (or) to preferentially locate within pasture or degraded areas	The Proposal follows the existing road and will result in removal of thin strips of vegetation adjacent to the existing highway. Impact to adjacent native vegetation and environmental aspects has been minimised by the current design to remain mostly within the road reserve (with minor areas intersecting Freehold land).
Installation of kerbing	Kerbing is not appropriate in this instance and location, where the shoulder is used as an emergency stopping area.
Simplification of design to reduce number of lanes and/or complexity of intersections	The design has been simplified as much as practicable to minimise impacts to the environment.
Preferential use of existing cleared areas for access tracks, construction storage and stockpiling	Temporary access tracks, construction storage, and storage/stockpile locations have been contained within the Impact Area, away from native vegetation as much as possible.
Drainage modification	The Proposal will improve drainage by replacing existing culverts and widening to cater for the widened formation. Table drains will also be improved to accommodate potentially larger drainage run-off due to the wider sealed area. The location of any additional drainage will avoid vegetation clearing as much as possible.

2.5 Approved Policies and Planning Instruments

The clearing of native vegetation in Western Australia is regulated under the *Environmental Protection Act 1994* (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.

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* (RIWI Act)
- *Aboriginal Heritage Act 1972* (WA).

Other Relevant policies and guidance documents:

- Environmental Offsets Policy (Government of Western Australia 2011)
- Guideline: Native vegetation clearing referrals (DWER October 2021)
- Procedure: Native vegetation clearing permits (DWER October 2021)
- Environmental Offsets Guidelines (DWER 2021)
- 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 Surveys

GHD Pty Ltd (GHD) conducted a biological assessment of the Impact Area and immediate surrounding area in August and September 2015, and September 2016 (GHD 2017). The GHD (2017) survey covered an area of 330.11 ha, which included 18.51 ha of the 33.44 ha Impact Area.

Botanica Consulting (Botanica) conducted a flora and fauna assessment of an area within the Impact Area and surrounding area from 5 October 2020 to 8 October 2020. The Botanica survey updated the vegetation condition mapping from the GHD (2017) assessment and included targeted searches for Threatened and Priority flora, and opportunistic sampling for Threatened fauna. The Botanica (2021) survey covered an area of 587 ha, which included 14.77 ha of the 33.44 ha Impact Area.

In total, the GHD (2017) and the Botanica (2021) surveys cover 33.28 ha of the 33.44 ha Impact Area. The remaining 0.16 ha has been extrapolated utilising the vegetation types and condition described in the Botanica (2021) and GHD (2017) surveys and an interrogation of aerial imagery. These extrapolated areas have not been subjected to surveys for significant flora or fauna species.

The extrapolated area includes:
- *Allocasuarina* and *Acacia* shrubland (VA03) – 0.04 ha,
- *Eucalyptus salubris* woodland (VA02) – 0.04 ha,
- Cleared areas – 0.08 ha.

Section 3.1.1 and 3.1.2 provides a summary of the surveys undertaken for the Proposal.

3.1.1 Summary of GHD (2017) Biological Assessment

The 330.11 ha survey area comprised 238.06 ha from the 2015 survey and 92.05 ha from the 2016 survey. The survey mapped ten vegetation types and three modified types across the survey area. All vegetation types were well represented in areas adjacent to the survey area (in central and eastern sections of the survey area) as well as in the local and broader areas. Vegetation condition was variable throughout the survey area and was correlated to the vegetation types. Areas rated as Degraded and Completely degraded aligned with modified vegetation types, particularly along road edges and pipelines. Within the Impact Area for the Proposal, three vegetation types and one modified non-native vegetation type is mapped. Parts of the Impact Area are cleared and contain no vegetation.

None of the vegetation types recorded during the GHD survey represented any Commonwealth or State-listed Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs).

221 flora taxa (including subspecies and varieties) representing 49 families and 129 genera were recorded from the GHD survey area during the field survey. This comprised 208 native taxa and 13 introduced taxa. The 13 introduced taxa are considered environmental weeds with the exception of **Echium plantagineum* (Paterson's Curse)[1], which is listed as a Declared Pest. **Echium plantagineum* was not recorded in the Impact Area, with the nearest record of the taxa being approximately 500 m west of the Impact Area.

[1] **denotes introduced taxa*

Three significant flora were recorded within the GHD survey area:
- *Leucopogon* sp. Yellowdine (M. Hislop & F. Hort MH 3194) (Priority 2),
- *Acacia filifolia* (Priority 3),
- *Acacia desertorum* var. *nudipes* (Priority 3).

The following significant flora species were recorded within the Impact Area:
- Four individuals of *Acacia filifolia* (Priority 3),
- 73 individuals of *Acacia desertorum* var. *nudipes* (Priority 3).

A likelihood of occurrence assessment identified no additional taxa as likely to occur, seven taxa as possibly occurring, and the remaining 16 taxa as unlikely to occur within the GHD survey area.

The GHD survey identified four main fauna habitat types, which broadly aligned with the vegetation types mapped within the survey area. These habitats include:
- *Allocasuarina* and *Acacia* shrubland,
- Mixed native shrubland,
- Native revegetation and regrowth,
- *Eucalyptus* woodland.

Within the Impact Area, *Allocasuarina* and *Acacia* shrubland, *Eucalyptus* woodland habitat and Mixed native shrubland are present. The 'Non-native species' modified vegetation type is dominated by agricultural cropping species, **Eragrostis curvula, *Avena barbata, *Raphanus raphanistrum* and **Arctotheca calendula*[2]. This modified habitat type was not considered to be of any value for fauna.

The fauna habitats of the GHD survey area are part of an extensive roadside reserve that extends for the majority of the length of the GEH (approximately 215 km) between Southern Cross and Kalgoorlie. As reported by GHD (2017), the habitat within both sides of the road reserve provides locally important temporary refuge as it was often used by a variety of native birds and mammals as a 'stepping stone' when crossing from one side of the road to the other, particularly sections where the pipeline and/or the powerline easement were close to the road.

The habitat types recorded within the GHD survey area are likely not considered to be exclusive to the survey area when aligned with the vegetation types and broad vegetation types and landforms. The habitats are considered to be well represented at a local and regional scale, when compared to the extent of the corresponding native vegetation types.

Fifty-two fauna species were recorded during the field survey within the GHD survey area and the adjoining areas. This total included 33 native birds, eight native and three introduced mammals, and eight native reptiles. Although not all 52 species were recorded within the GHD survey area, all species recorded during the survey have been previously recorded within the GHD survey area.

No significant fauna species were recorded during the GHD survey, however six significant fauna species are considered likely to occur or likely to utilise the habitats within the GHD survey area.

3.1.2 Summary of Botanica (2021) Flora and Fauna Assessment

The Botanica (2021) flora and fauna assessment covered 587 ha and included the following:

[2] **denotes introduced taxa*

- A review of previous biological surveys and updates to the flora likelihood of occurrence table provided for Ghooli, Karalee and Quardanoolagin. The Impact Area is located within the Botanica (2021) Ghooli survey area.
- A desktop likelihood of occurrence for Threatened and Priority flora and Threatened fauna.
- A targeted field survey for Threatened and Priority flora, including the mapping of the extent of populations.
- Opportunistic sampling for Threatened and Priority fauna which may occur in the Botanica (2021) survey area.
- Updates to the vegetation condition mapping from previous surveys of the area.

Botanica (2021) mapped approximately 52% of the vegetation within the Botanica survey area to be in 'Excellent' to 'Very Good' condition with vegetation structure largely intact and disturbances limited to occasional vehicle tracks. Approximately 12% of the Botanica (2021) survey area was in 'Very good' to 'Good' condition, with such vegetation located adjacent to largely cleared areas (i.e., adjacent to private property or located between the highway and Goldfields pipeline) and weed invasion observed within these areas. Approximately 6% of the Botanica (2021) survey area was rated as 'Degraded' to 'Completely Degraded' with these areas comprised of scattered native trees and shrubs over weedy herbs and grasses or non-native vegetation. The remaining extent of the Botanica (2021) survey area (approximately 30%) comprised of cleared vegetation.

Botanica (2021) identified seven Priority flora species within the Botanica (2021) survey area, including:

- *Verticordia stenopetala* (Priority 3),
- *Stylidium choreanthum* (Priority 3),
- *Acacia desertorum* var. *nudipes* (Priority 3),
- *Acacia filifolia* (Priority 3),
- *Banksia lullfitzii* (Priority 3),
- *Leucopogon* sp. Yellowdine (M. Hislop & F. Hort MH 3194) (Priority 2),
- *Verticordia dasystylis* subsp. *dasystylis* (Priority 2).

None of the above Priority flora species were recorded in the Impact Area during the Botanica survey.

No significant fauna species were recorded during the Botanica (2021) survey, including no records of Malleefowl mounds.

4 VEGETATION DETAILS

4.1.1 Proposal Site Vegetation Description

The Impact Area is located within the Coolgardie Interim Biogeographic Regionalisation for Australia (IBRA) bioregion and Southern Cross (COO02) subregion. There are four pre-European vegetation associations within the Impact Area. The vegetation associations and their extents are presented within Table 2 and 3.

Table 2. Summary of the Impact Area's Mapped Pre-European Vegetation Associations

Pre-European Vegetation Association(s)	Clearing Description	Vegetation Condition	Comments
Vegetation Association 1413 described as Shrublands; *acacia, casuarina* and *melaleuca* thicket.	Clearing of up to 14.78 ha of native vegetation for the upgrade along the GEH.	Excellent to Good (GHD 2017, Botanica 2021)	Vegetation description and condition determined from the GHD (2017) survey, the Botanica (2021) survey and aerial imagery.
Vegetation Association 536 described as Medium woodland; morrell and rough fruited mallee (*Eucalyptus corrugata*).			
Vegetation Association 141 described as Medium woodland; York gum, salmon gum and gimlet.			
Vegetation Association 1148 described as Shrublands; scrub-heath in the Coolgardie Region.			

Table 3. Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Veg Assoc No. 1413	**Statewide** Western Australia	1,679,916	1,286,855	76.60	17.25
	IBRA Bioregion Coolgardie	1,061,212	1,042,554	98.24	18.50
	IBRA Sub-region Southern Cross	953,238	934,826	98.07	19.76
	Local Government Authority Shire of Yilgarn	538,791	395,458	73.40	26.24
Veg Assoc No. 536	**Statewide** Western Australia	13,178	5,433	41.23	22.31
	IBRA Bioregion Coolgardie	2,007	1,463	72.90	-
	IBRA Sub-region Southern Cross	2,007	1,463	72.90	-
	Local Government Authority Shire of Yilgarn	6,807	3,171	46.59	40.28
Veg Assoc No. 141	**Statewide** Western Australia	1,158,760	960,756	82.91	42.50
	IBRA Bioregion	883,086	858,525	97.22	47.39

Pre-European Vegetation Association	Scale	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
	Coolgardie				
	IBRA Sub-region Southern Cross	883,086	858,525	97.22	47.39
	Local Government Authority Shire of Yilgarn	711,450	690,599	97.07	40.96
Veg Assoc No. 1148	**Statewide** Western Australia	260,384	258,227	99.17	17.68
	IBRA Bioregion Coolgardie	254,932	252,776	99.15	17.28
	IBRA Sub-region Southern Cross	254,932	252,776	99.15	17.28
	Local Government Authority Shire of Yilgarn	79,301	77,149	97.29	26.29

4.1.2 Vegetation Units and Condition

In total, the GHD (2017) and the Botanica (2021) surveys cover 33.28 ha of the 33.44 ha Impact Area. The remaining 0.16 ha has been extrapolated utilising the vegetation types and condition described in the Botanica (2021) and GHD (2017) surveys and an interrogation of aerial imagery.

The extrapolated area includes:

- *Allocasuarina* and *Acacia* shrubland (VA03) – 0.04 ha,
- *Eucalyptus salubris* woodland (VA02) – 0.04 ha,
- Cleared – 0.08 ha.

The extrapolated area has been included in the total area of native vegetation detailed in Table 4. The total area of native vegetation mapped was 14.78 ha.

Native vegetation within the Impact Area is in a variable condition, largely due to the presence of the existing GEH. The native vegetation condition ranged from 'Excellent' to 'Good'. The majority of the native vegetation within the Impact Area was in 'Excellent' condition (77.53%).

Table 4. Native vegetation types within the Impact Area

Code	Native Vegetation Association Name	Native Vegetation Description	Extent (ha) within the Impact Area	Condition (GHD 2017, Botanica 2021)
VA02	*Eucalyptus salubris* woodland	*Eucalyptus salubris* woodland with ± *E. salmonophloia* trees over *Santalum acuminatum* low isolated trees with *Melaleuca sheathiana* tall open shrubland over *Daviesia benthamii* subsp. *acanthoclona, Eremophila oppositifolia* subsp. *angustifolia, E. scoparia* mid-sparse shrubland over	4.03	Excellent: 3.12 ha Very good: 0.77 ha Good: 0.14 ha

Code	Native Vegetation Association Name	Native Vegetation Description	Extent (ha) within the Impact Area	Condition (GHD 2017, Botanica 2021)
		Olearia muelleri, Maireana villosa, Atriplex vesicaria low open shrubland over *Austrostipa elegantissima* isolated tussock grasses.		
VA03	*Allocasuarina* and *Acacia* shrubland	*Callitris preissii, Acacia yorkrakinensis* subsp. *acrita, A. resinimarginea, Hakea* spp. tall open shrubland with *Eucalyptus?rigidula*, *E. horistes* low isolated mallees over *Allocasuarina corniculata*, *A. campestris, Acacia beauverdiana, Melaleuca ?atroviridis* mid- shrubland over *Thryptomene kochii, Micromyrtus obovata, Phebalium filifolium*, *Euryomyrtus maidenii, Beyeria sulcata* var. *sulcate* low open shrubland over ± *Triodia rigidissima* isolated hummock grasses.	10.29	Excellent: 7.88 ha Very good: 2.41 ha
VA04	Mixed shrubland	*Hakea erecta, H. platysperma, Callitris preissii* tall sparse shrubland with *Grevillea pterosperma, H. francisiana* emergent low trees/tall shrubs and ± *Eucalyptus leptopoda* subsp. *leptopoda mallees* over *Allocasuarina campestris, A. corniculata*, *Melaleuca ?atroviridis, Baeckea elderiana* midshrubland over *M. calyptroides, Micromyrtus obovatus, Euryomyrtus maidenii, M. cordata* low shrubland *over Ecdeiocolea monostachya, Lepidosperma sanguinolentum, Lepidobolus preissianus* subsp. *volubilis* sedgeland/rushland and *Triodia rigidissima* isolated hummock grasses.	0.46	Excellent: 0.46 ha
Total native vegetation within the DE			**14.78**	

The Impact Area comprises 14.78 ha native vegetation, plus 0.18 ha of non-native vegetation (non-native species) and 18.48 ha of cleared areas. Disturbances impacting the Impact Area, and affecting the condition throughout the Impact Area, include edge effects from the existing GEH, clearing, weed infestation, vehicle tracks and historic clearing. Areas of the Impact Area completely devoid of vegetation including roads, tracks or clearing associated with the GEH were categorised as 'Cleared' and not assessed for vegetation condition. Vegetation condition rating and extents for the entire Impact Area are listed in Table 5 below.

Table 5. Vegetation Condition (GHD 2017, Botanica 2021)

Condition	Extent in Impact Area (ha)	% of Impact Area
Excellent	11.46	34.27
Very good	3.18	9.51
Good	0.14	0.42
Sub-total	**14.78**	**44.2**
Non-native vegetation	0.18	0.54
Cleared	18.48	55.26
Total	**33.44**	**100**

5 ASSESSMENT AGAINST THE TEN CLEARING PRINCIPLES

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

Each principle has been assessed in accordance with Department of Water and Environmental Regulation's (DWER's) 'Guideline: Native vegetation clearing referrals' and other relevant CPS 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 likely to be at variance to this Principle

Comment

Vegetation and flora

The Impact Area comprises 14.78 ha of native vegetation ranging from 'Excellent' to 'Good' condition, with 77.53% of the native vegetation mapped as 'Excellent' (GHD 2017, Botanica 2021).

In total, the GHD (2017) and the Botanica (2021) surveys cover 33.28 ha of the 33.44 ha Impact Area. The remaining 0.16 ha was extrapolated utilising the vegetation types and condition described in the Botanica (2021) and GHD (2017) surveys and an interrogation of aerial imagery. These extrapolated areas have not been subjected to surveys for significant flora or fauna species.

The dominant native vegetation type across the Impact Area consisted of '*Allocasuarina* and *Acacia* shrubland', followed by *'Eucalyptus salubris* woodland'. The native vegetation proposed to be cleared for the Proposal is well represented locally and regionally.

A search of the Department of Biodiversity, Conservation and Attractions (DBCA) TEC/PEC database did not identify any TECs and PECs within the assessment area. The GHD (2017) survey confirmed the vegetation types mapped within the Impact Area are not considered representative of any Federal or State listed TECs or PECs. Given the distance to this record (approximately 9.74 km north-east of the Impact Area), no impacts to this PEC are expected as a result of Proposal activities.

The *NatureMap* database search identified the presence/potential presence of 427 flora taxa within the assessment area. The GHD (2017) survey recorded the presence of 221 flora taxa (including subspecies and varieties) representing 49 families and 129 genera within the GHD survey area. The GHD (2017) survey confirmed the presence of 208 native taxa and 13 introduced taxa (note that the Botanica (2021) survey only concentrated on flora species that had the potential to occur as a result of the GHD survey (2017) results).

A total of 34 Threatened and Priority flora species were identified from desktop searches (Protected Matters Search Tool [PMST], DBCA, *NatureMap*, Western Australian Herbarium [WAHERB]) as present/potentially present within the assessment area. No Threatened flora listed under the EPBC Act or the BC Act were recorded within the Impact Area (GHD 2017, Botanica 2021). Two DBCA Priority listed flora species were recorded within the Impact Area, including (GHD 2017, Botanica 2021):

- Four individuals of *Acacia filifolia* (Priority 3),
- 73 individuals of *Acacia desertorum* var. *nudipes* (Priority 3).

Individuals of *Leucopogon sp. Yellowdine* (M. Hislop & F. Hort MH 3194) (Priority 2) and *Banksia lullfitzii* (Priority 3) were recorded adjacent to the DE.

No additional significant flora species were identified as 'likely' to occur within the Impact Area (GHD 2017, Botanica 2021). However, two species were considered possible to occur:

- *Goodenia heatheriana* (Priority 1),
- *Rinzia fimbriolata* (Priority 1).

Both species have been recorded within 10 km of the GHD (2017) and Botanica (2021) survey areas, however, were not recorded within either survey.

It should be noted that between the two surveys completed for the Impact Area (GHD 2017, Botanica 2021), there is 0.16 ha of unsurveyed areas that could potentially comprise significant flora individuals.

Potential impacts to Priority flora species known to occur within the Impact Area have been estimated by interrogating records on *FloraBase* (Western Australian Herbarium, 1998-), DBCA records and datasets provided to Main Roads under licence agreements.

Four individuals of *Acacia filifolia* were recorded within the Impact Area. The GHD (2017) survey recorded 475 individuals of *Acacia filifolia* within the GHD survey area and the Botanica survey recorded one individual within the Botanica (2021) survey area. The species was found within the Mixed native shrubland vegetation type along both sides of GEH. *Acacia filifolia* grows in yellow and gravelly sands on plains and is currently known from the Avon Wheatbelt, Coolgardie and Geraldton Sandplains IBRA bioregions. This species is considered locally common, and the GHD (2017) survey noted the taxa was also observed growing in areas beyond the GHD survey area and that the species has been previously collected from the area. There are numerous *FloraBase* and DBCA records of the species across south-west Australia, although count data of individual plants is not known. Clearing of four individual species represents 0.84% of recorded individuals in the immediate area. The Proposal is not expected to significantly impact upon *Acacia filifolia*.

Seventy-three individuals of *Acacia desertorum* var. *nudipes* were recorded within the Impact Area. The GHD (2017) survey recorded 650 individuals of this species within the GHD survey area and the Botanica (2021) survey recorded 242 individuals within the Botanica survey area. The species was found growing within the Mixed native shrubland and the *Allocasuarina* and *Acacia* shrubland vegetation types. The species was recorded from both sides of the highway and co-occurred with *Acacia filifolia*. *Acacia desertorum* var. *nudipes* grows on yellow sandplains and lateritic gravel, in heath and tall open shrubland and is currently known from the Coolgardie IBRA bioregion, largely restricted between Southern Cross and Boorabbin. The GHD (2017) survey noted that *Acacia desertorum* var. *nudipes* grew in areas beyond the survey area and the species has been previously collected from the area. There are numerous *FloraBase*, WA Herbarium and DBCA records of these species within the region and the species is considered locally common. Clearing of 73 individuals of *Acacia desertorum* var. *nudipes* for the Proposal represents 8.07% of the recorded individuals within the immediate area. The Proposal is not expected to significantly impact upon *Acacia desertorum* var. *nudipes*.

<u>Fauna habitat</u>

Three native vegetation fauna habitat types were recorded within the Impact Area during the biological survey (GHD 2017), which broadly aligns with the native vegetation types mapped within the Impact Area. These habitat types include:

- *Allocasuarina* and *Acacia* shrubland,
- Mixed native shrubland,
- *Eucalyptus* woodland.

The dominant fauna habitat type within the DE was the '*Allocasuarina* and *Acacia* shrubland'. The fauna habitats of the DE are part of an extensive roadside reserve that extends for the majority of the length of the GEH (approximately 215 km) between Southern Cross and Kalgoorlie. The habitat within both sides of the road reserve provides locally important temporary refuge. GHD (2017) noted the road reserve habitat was often used by a variety of native birds and mammals as a 'stepping stone' when crossing from one side of the road to the other.

Fauna

The *NatureMap* database search identified the presence/potential presence of 191 fauna species within the assessment area. The GHD (2017) survey recorded the presence of 52 fauna species, including 33 native birds, eight native and three introduced mammals and eight native reptiles.

Desktop searches (PMST, DBCA, *NatureMap*) identified the presence/potential presence of 12 significant fauna taxa within the assessment area. No significant fauna species were recorded during the field surveys (GHD 2017, Botanica 2021). A likelihood of occurrence assessment (GHD 2017) identified six species of significance as likely to occur or utilise the habitats within the DE and these are discussed further under Principle (b).

It should be noted that between the two surveys completed for the DE (GHD 2017, Botanica 2021), there is 0.16 ha of unsurveyed areas that could potentially comprise significant fauna individuals.

Environmentally Sensitive Areas

The DE is not located within an Environmentally Sensitive Area (ESA). The nearest ESA is located approximately 600 m north of the DE.

Conservation Estates

The DE is not located within, or adjacent to, a reserve and/or a conservation area. The closest reserve is the Yellowdine Nature Reserve (R41936), which is located approximately 600 m north of the DE.

The Proposal involves clearing of up to 14.78 ha native vegetation with 77.53% of the native vegetation mapped as 'Excellent' condition. Native vegetation within the Impact Area supports priority flora, specifically *Acacia desertorum* var. *nudipes* and *Acacia filifolia.* Proposed clearing of 73 individuals of *Acacia desertorum* var. *nudipes* and four individuals of *Acacia filifolia* will result in a respective 8.07% and 0.84% reduction of recorded individuals in the immediate vicinity of the Impact. The clearing of native vegetation occurs within a narrow linear section of road corridor vegetation, along an existing highway. Native vegetation within the Impact Area is well represented locally and regionally. Although the vegetation proposed to be cleared is known to support significant flora, there is vegetation located adjacent to the Impact Area in Good or better condition that can maintain significant flora and fauna and supporting habitat.

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

Methodology

GHD (2017)
Botanica (2021)
DAWE (2021)
DBCA (2021)
EPA (2016)
GIS Database:

- Threatened and Priority Ecological Communities
- Threatened and Priority Flora (WA Herbarium and TPFL)
- Threatened and Priority Fauna
- DBCA Legislated Lands and Waters
- DWER Clearing Regulations – Environmentally Sensitive Areas.

(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

Comment

The Impact Area comprises 14.78 ha of native vegetation which is suitable fauna habitat. In total, the GHD (2017) and the Botanica (2021) surveys cover 33.28 ha of the 33.44 ha Impact Area. The remaining 0.16 ha was extrapolated utilising the fauna habitats described in the Botanica (2021) and GHD (2017) surveys and an interrogation of aerial imagery. These extrapolated areas have not been subjected to surveys and could potentially comprise significant fauna species.

Fauna habitat

Three native vegetation fauna habitat types were recorded within the Impact Area during the biological survey (GHD 2017), which broadly align with the native vegetation types mapped within the Impact Area. These habitats include:

- *Allocasuarina* and *Acacia* shrubland (10.29 ha),
- Mixed native shrubland (0.46 ha),
- *Eucalyptus* woodland (4.03 ha).

The *Allocasuarina* and *Acacia* shrubland habitat is the dominant habitat type within the Impact Area and is considered to be of moderate to high value habitat for fauna. This habitat is part of a mostly continuous corridor of remnant vegetation extending through the Impact Area and provides potential hunting/foraging and breeding opportunities for the Woma, Western Rosella and Central Long-eared Bat. The habitat within the Impact Area also provides occasional foraging and dispersal habitat for the Malleefowl and Chuditch, because it is part of a much larger contiguous area of remnant vegetation.

The *Eucalyptus* woodland habitat is considered to be of moderate to high value habitat for fauna. This habitat is part of a continuous corridor of remnant vegetation extending beyond the Impact Area and provides potential hunting/foraging and breeding opportunities for the Woma, Western Rosella and Central Long-eared Bat. There are limited breeding opportunities (e.g. large logs with hollow openings > 20 cm were uncommon) for the Chuditch. The habitat also provides occasional foraging, dispersal and refuge habitat for the Malleefowl.

The Mixed native shrubland habitat is considered to be of moderate value habitat for fauna. This habitat is part of a contiguous area of remnant vegetation extending beyond the DE and provides potential hunting and breeding opportunities for the Woma and foraging and refuge habitat for Central Long-eared Bat and Western Rosella. The habitat also provides dispersal habitat for the Malleefowl and the Chuditch because it is part of a much larger contiguous area of remnant vegetation.

The fauna habitats of the Impact Area are part of an extensive roadside reserve that extends for the majority of the length of the GEH (approximately 215 km) between Southern Cross and Kalgoorlie. The habitat within both sides of the road reserve provides a locally important temporary refuge. GHD (2017) noted the road reserve habitat was often used by a variety of native birds and mammals as a 'stepping stone' when crossing from one side of the road to the other. As the Proposal will not completely clear the vegetation on both sides of the road, the remaining vegetation will continue to provide this purpose.

Desktop searches (PMST, DBCA, NatureMap) identified the presence/potential presence of 12 significant fauna taxa within the assessment area.

No significant fauna species were recorded during the field surveys (GHD 2017, Botanica 2021). In addition, Botanica (2021) did not record any Malleefowl mounds within the Impact Area. A likelihood of occurrence assessment (GHD 2017) identified six species of significance as likely to occur or utilise the habitats within the Impact Area. These species include:

- Malleefowl, *Leipoa ocellata* (EPBC Act: Vulnerable, BC Act: Vulnerable),
- Chuditch, *Dasyurus geoffroii* (EPBC Act: Vulnerable, BC Act: Vulnerable),
- Woma, *Aspidites ramsayi* (southwest subpop.) (Priority 1),
- Western Rosella (inland sp), *Platycercus icterotis xanthogenys* (Priority 4),
- Central Long-eared Bat, *Nyctophilus major tor* (Priority 4),
- Masked Owl (SW ssp), *(Tyto novaehollandiae novaehollandiae)* (Priority 4).

Malleefowl

The field surveys did not record any individuals of the Malleefowl within the Impact Area, nor were any records of Malleefowl mounds recorded (GHD 2017, Botanica 2021). There are two DBCA records of this species within a 10 km radius of the Impact Area, located approximately 9 km north-west and 8 km north of the Impact Area. The Impact Area is part of the area of occupancy of the species, however it is unknown if it forms part of an area occupied by or is part of an important population (GHD 2017). The *Allocasuarina* and *Acacia* shrubland and the Open *Eucalyptus* Woodland habitats provide occasional foraging and dispersal habitat for the Malleefowl and these habitats are part of an area of contiguous vegetation. The Malleefowl may use the vegetation within the Impact Area, particularly sections east of the Ghooli locality as part of its larger home range for foraging and/or for local movements along and across the GEH and during the dispersal period for sub-adult birds. The Impact Area comprises 14.78 ha of potentially suitable foraging/dispersal habitat for the Malleefowl.

Chuditch

The field surveys did not record any individuals of the Chuditch within the Impact Area (GHD 2017, Botanica 2021). There is one DBCA record of the species within 10 km of the Impact Area, located approximately 500 m north of the Impact Area. The GHD (2017) survey determined that there is limited breeding habitat and breeding opportunities within the Impact Area. The habitat within the local area and region is potentially well represented based on the surrogate of native vegetation mapping completed by GHD (2017). However, the value and extent of this habitat (e.g. breeding and denning habitat in the form of hollow-bearing logs/trees) is unknown and it is considered unlikely that all habitats in the DE and greater locality provide the habitat requirements for the Chuditch (GHD 2017). In addition, parts of the greater locality have been recently burnt within the last 10 years (with areas burnt less than 5 years ago) and the likelihood of the burnt areas supporting breeding resources (e.g. hollow-bearing trees and fallen logs with hollows) is likely to have been reduced. The Impact Area is part of the area of occupancy for the species, however it is unknown if it forms part of an area occupied by or is part of an important population (GHD 2017). Hunting habitat is present throughout the Impact Area, particularly the areas east of the Ghooli locality. Potentially suitable breeding habitat is present which is largely confined to the Eucalypt woodland habitat, in particular the Eucalypt woodlands with larger trees and fallen hollow logs of suitable diameter, which were uncommon during the GHD (2017) survey. Habitat within the Impact Area is mostly contiguous vegetation and is part of a broader corridor for movement. The habitats of the Impact Area, in particular the Eucalypt woodland habitats may form part of an individual's home range. The Impact Area comprises 14.78 ha of potentially suitable foraging/dispersal habitat for the Chuditch.

Woma

The field surveys did not record any individuals of the Woma within the Impact Area (GHD 2017, Botanica 2021). There are two DBCA records of the species within 10 km of the Impact Area, located approximately 3.5 km south-east and approximately 300 m north of the Impact Area. The Woma may breed and hunt within all habitats within the Impact Area, particularly in areas with good ground cover, animal burrows and within Eucalypt woodland. Animal burrows were commonly recorded (mostly goanna and other reptiles) during the GHD (2017) survey. The Impact Area comprises 14.78 ha of potentially suitable foraging/dispersal habitat for the Woma.

Western Rosella (inland ssp)

The field surveys did not record any individuals of the Western Rosella within the Impact Area (GHD 2017, Botanica 2021) and there are no DBCA records within a 10 km radius of the Impact Area. Potentially suitable foraging habitat and potentially suitable breeding habitat (e.g. Eucalypt woodland/trees with hollows) is present throughout the Impact Area. The species requires Eucalypt woodlands for breeding and

nesting which was present in in the Impact Area. The Impact Area comprises 14.78 ha of potentially suitable foraging/dispersal habitat for the Western Rosella.

Central Long-eared Bat
The field surveys did not record any individuals of the Central Long-eared Bat within the Impact Area (GHD 2017, Botanica 2021) and there are no records of the species within a 10 km radius of the Impact Area. Potentially suitable hunting habitat and potentially suitable breeding and roosting habitat (i.e. Eucalypt woodlands with hollow-bearing trees and crevices) is present throughout the Impact Area. The species can potentially use isolated Eucalypts with small hollows for roosting and breeding. The Impact Area comprises 14.78 ha of potentially suitable foraging/dispersal habitat for the Central Long-eared Bat.

Masked Owl
The field surveys did not record any individuals of the Masked Owl within the Impact Area (GHD 2017, Botanica 2021) and there are no DBCA records within a 10 km radius of the Impact Area. Potentially suitable foraging and breeding habitat is present throughout the Impact Area. The species is likely to require tall Eucalypt woodlands, particularly woodlands with trees with large hollows (i.e. hollows probably > 20 cm diameter) for breeding and nesting which are mostly restricted to the Eucalypt woodland habitats around the Ghooli locality and east of the Ghooli locality in the Impact Area. Habitat within the survey area is mostly contiguous vegetation and is part of a broader corridor for movement. The Impact Area comprises 14.78 ha of potentially suitable foraging/dispersal habitat for the Masked Owl.

The Proposal has the potential to reduce the width of an existing wildlife corridor and widen an existing barrier to the movement of fauna (albeit to a small extent) (GHD 2017). However, the vegetation proposed to be cleared is not considered to represent significant habitat necessary for the maintenance of threatened fauna species. The fauna habitat types recorded within the Impact Area are not exclusive to the Impact Area and are well represented at a local and regional scale. Significant fauna species may infrequently visit the Impact Area, however would unlikely be reliant on any of the habitat that occurs within the Impact Area. Given the thin, linear nature of the clearing required for the Proposal from substantially larger patches of contiguous vegetation, and the proximity of the Proposal to the existing road, it is considered unlikely that the Impact Area represents key habitat for any significant fauna species.

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

Methodology
GHD (2017)
Botanica (2021)
DAWE (2021)
DBCA (2021)
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.

Proposal is not at variance to this Principle

Comment
No threatened flora were identified within the Impact Area by GHD (2017) or Botanica (2021) and none are considered likely to occur.

The proposed clearing is not at variance to this Principle.

Methodology
GHD (2017)
Botanica (2021)

DAWE (2021)
DBCA (2021)
GIS Database:
- Threatened and Priority Flora (WA Herbarium and TPFL).

(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

Comment
A search of DBCA's TEC/PEC database and the EPBC Act PMST did not identify any TECs within the assessment area.

The GHD (2017) survey confirmed that the vegetation types mapped within the Impact Area are not considered representative of any Federal or State listed TECs.

The proposed clearing is not at variance to this Principle.

Methodology
GHD (2017)
DAWE (2021)
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.

Proposed clearing is not at variance to this Principle

Comment

The Impact Area comprises 14.78 ha of native vegetation ranging from 'Excellent' to 'Good' condition, with 77.53% of the native vegetation mapped as 'Excellent' (GHD 2017, Botanica 2021).

The Impact Area is not located within a "constrained" area. Vegetation Associations 1413, 1068, 536 and 141 have over 30% pre-European vegetation remaining within the State, IBRA region and sub-region, and LGA levels. The clearing of native vegetation for the Proposal will not significantly reduce the mapped extent or percent remaining for any of the Vegetation Associations identified within the Impact Area.

The Proposal comprises an upgrade of a section of the existing GEH area which is already highly disturbed. The vegetation within the Impact Area is well represented locally and regionally and is not considered significant as a remnant of native vegetation.

Summary of Impact Area's Mapped Pre-European Vegetation Associations

Pre-European Vegetation Association(s)	Clearing Description	Vegetation Condition	Comments
Vegetation Association 1413 described as Shrublands; *acacia, casuarina* and *melaleuca* thicket.	Clearing of up to 14.78 ha of native vegetation for the upgrade along the GEH.	Excellent to Good (GHD 2017, Botanica 2021)	Vegetation description and condition determined from the GHD (2017), the Botanica (2021) survey and aerial imagery.
Vegetation Association 536 described as Medium woodland; morrell and rough fruited mallee (Eucalyptus corrugata).			
Vegetation Association 141 described as Medium woodland; York gum, salmon gum and gimlet.			
Vegetation Association 1148 described as Shrublands; scrub-heath in the Coolgardie Region.			

Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Veg Assoc No. 1413	**Statewide** Western Australia	1,679,916	1,286,855	76.60	17.25
	IBRA Bioregion Coolgardie	1,061,212	1,042,554	98.24	18.50
	IBRA Sub-region Southern Cross	953,238	934,826	98.07	19.76
	Local Government Authority Shire of Yilgarn	538,791	395,458	73.40	26.24
Veg Assoc No. 536	**Statewide** Western Australia	13,178	5,433	41.23	22.31
	IBRA Bioregion Coolgardie	2,007	1,463	72.90	-
	IBRA Sub-region Southern Cross	2,007	1,463	72.90	-
	Local Government Authority Shire of Yilgarn	6,807	3,171	46.59	40.28
Veg Assoc No. 141	**Statewide** Western Australia	1,158,760	960,756	82.91	42.50
	IBRA Bioregion Coolgardie	883,086	858,525	97.22	47.39
	IBRA Sub-region Southern Cross	883,086	858,525	97.22	47.39
	Local Government Authority Shire of Yilgarn	711,450	690,599	97.07	40.96
Veg Assoc No. 1148	**Statewide** Western Australia	260,384	258,227	99.17	17.68
	IBRA Bioregion Coolgardie	254,932	252,776	99.15	17.28

	IBRA Sub-region Southern Cross	254,932	252,776	99.15	17.28
	Local Government Authority Shire of Yilgarn	79,301	77,149	97.29	26.29

The proposed clearing is not at variance to this Principle.

Methodology

GHD (2017)

Botanica (2021)

Beard (1975)

GoWA (2021)

GIS Database:

- Aerial Imagery
- DPIRD Remnant Vegetation
- 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.

Proposed clearing is not at variance to this Principle

Comment

No rivers or major streamlines intersect the Impact Area. The nearest minor river runs north to south through Yellowdine, approximately 7 m east of the Impact Area.

No vegetation communities within the Impact Area have values associated with wetland or dampland vegetation. No riparian vegetation was recorded during the field surveys (GHD 2017, Botanica 2021).

A search of the PMST did not identify any Wetlands of International Importance (i.e. Ramsar wetlands) or Nationally Important Wetlands within the Impact Area. No significant surface water features are present within the Impact Area and the Proposal will not result in clearing of vegetation growing in, or in association with, a watercourse or wetland.

The Proposal is not at variance to this Principle.

Methodology

GHD (2017)
Botanica (2021)
GIS Database:

- Aerial Imagery
- Directory of Important Wetlands
- Ramsar Wetlands
- Hydrography, Linear.

(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

Comment

The Impact Area is located within the Southern Cross Zone of the Kalgoorlie Soil-landscape Province. This zone is characterised by undulating plains and uplands (with some salt lakes and low hills) on deeply weathered mantle, colluvium and alluvium over greenstone and granitic rocks of the Yilgarn Craton (Tille 2006).

The underlying bedrock geology within the Impact Area is characterised as A-SDB-mg (Metagranite; commonly foliated; includes granodiorite to monzogranite) (GoWA 2021).

Within the DE, three soil types occur (based on best available mapping, GoWA 2021):

- 261Bd_3u – Duplex sandy gravel. This soil type is located within the west portion of the Impact Area, by Ghooli,
- 261ACq – Yellow sandy earth. This soil type is the dominant soil type within the Impact Area, and is located within the centre to the east of the Impact Area,
- 261Bd_2 – Yellow/brown deep sandy duplex. This soil type is located within the west of the Impact Area, to the east of the 261Bd_3u soil type.

The Proposal is unlikely to alter drainage regimes or hydrology within the vicinity of the Impact Area. Surface water management measures will be implemented as part of the Proposal design to maintain drainage and existing flow lines consistent with the existing GEH.

The Impact Area is mapped as having a moderate risk of wind erosion and a low risk of water erosion. In addition, the majority of the Proposal is mapped as having a low risk of subsurface acidity, with a small area to the west of the Impact Area having a moderate risk, and the entire Impact Area is mapped as having a low risk of surface acidity and water erosion risk. The Proposal will implement management measures to reduce the risk of soil erosion and degradation.

The Proposal is at concept stage only and the final extent of ground disturbance is anticipated to be less than assessed within this report. Given the linear nature of the clearing and that the majority of the GEH upgrade works will be sealed upon completion, the proposed clearing is not likely to lead to an appreciable increase in land degradation, through erosion and sedimentation, to surrounding areas.

Standard erosion and dust management control measures will be implemented during construction to reduce the incidence of wind erosion.

Therefore, the proposed clearing is not likely to be at variance to this Principle.

Methodology

GHD (2017)
Botanica (2021)
GIS Database:

- Soil Systems
- Bedrock geology
- Soil landscape land quality – Wind Erosion Risk
- Soil landscape land quality – Water Erosion Risk
- Soil landscape land quality – Surface Acidity
- Soil landscape land quality – Subsurface Acidity.

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

Proposed clearing is not at variance to this Principle

Comment

The Impact Area is not located within any conservation reserves or DBCA managed lands. The closest reserve is the Yellowdine Nature Reserve (R41936), which is located approximately 600 m north of the Impact Area.

Given the distance from any nature reserves, no impact to conservation reserves or DBCA managed lands will occur as a result of the Proposal.

The proposed clearing is not at variance to this Principle.

Methodology

DBCA shapefiles
EPA (2016)
GHD (2017)
Botanica (2021)

(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

Comment

The Impact Area is located within the Goldfields groundwater area which is proclaimed under the RIWI Act. Proposal

The Impact Area is not located within any Public Drinking Water Source Areas (PDWSAs). The Proposal is unlikely to involve dewatering, drawing water from an existing bore or surface water body or installation of a new or alteration of an existing water bore.

The Impact Area is not located within a surface water area proclaimed under the RIWI Act, nor does it intersect any watercourses. The nearest minor river runs north to south through Yellowdine, approximately 7 m east of the Impact Area. The potential for contamination of this surface water feature to occur during clearing for the Proposal due to the accidental release of hazardous materials, runoff and from contaminated sediments or dust is negligible.

A search of the EPBC Act PMST did not identify any Wetlands of International Importance (i.e., Ramsar wetlands) within the Impact Area. No Nationally Important Wetlands are located within or in the vicinity of the Impact Area. No vegetation communities within the Impact Area have values associated with wetland or dampland vegetation. No riparian vegetation was recorded during the field survey (GHD 2017).

Clearing associated with the Proposal is unlikely to cause deterioration in the quality of surface and/or underground water.

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

Methodology

GHD (2017)
Botanica (2021)
DAWE (2021)
GIS Database:

- Public Drinking Water Source Areas
- RIWI Act, Surface Water Areas and Irrigation Districts
- RIWI Act, Groundwater Areas
- Directory of Important Wetlands
- Ramsar Wetlands
- Hydrography, Linear

(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

Comment

The Impact Area is mapped as having a low risk of flooding and water erosion (GoWA 2021). The Impact Area is also mapped as having a low waterlogging risk. Surface water management measures will be implemented as part of Proposal design to maintain existing drainage in the area and to avoid impact to adjacent native vegetation through waterlogging.

Road runoff and storm water will be managed via the Construction Environment Management Plan (CEMP) with the objective of maintaining local hydrological regimes through enabling infiltration close to the point of collection.

Given that the proposed clearing constitutes removal of a linear strip of vegetation from the edges of substantially larger remnant patches, it is unlikely the clearing will result in any changes to the local incidence or intensity of flooding. The proposed clearing is not likely to be at variance to this Principle.

Methodology

GHD (2017)
Botanica (2021)
GIS Database:

- Soil landscape land quality - Flood Risk
- Soil landscape land quality - Water Erosion Risk
- Soil landscape land quality - Waterlogging Risk.

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.	**No**	No further action required. A VMP has been completed, refer to Appendix 1
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 Proposal involves clearing for temporary works (as defined by CPS 818).	**No**	No further action required.
4a. Proposal 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 Principal Environmental Management Requirements (PEMRs) 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.

7 STAKEHOLDER CONSULTATION

No stakeholder consultation has been undertaken for this Proposal. As the Proposal design further develops, Main Roads will undertake stakeholder consultation as necessary.

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 proposal (refer to Appendix 1).

9 REFERENCES

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10 APPENDICES

Appendix	Title
Appendix 1	Vegetation Management Plan
Appendix 1.1	Vegetation Management Requirements

Appendix 1: Vegetation Management Plan

GREAT EASTERN HIGHWAY GHOOLI STAGE 1

Purpose and Scope

This Vegetation Management Plan (VMP) has been prepared by Main Roads for the purpose of managing native vegetation clearing impacts associated with the Proposal.

The Proposal will involve the upgrade of GEH between SLK 378.23 – 395. The upgrade is required as the road is currently in poor condition and is a potential safety hazard. The Proposal is comprised of the following components:

- Widening formation to 11 metres (m) with 11 m seal (two x 3.5 m traffic lanes, two x 2 m sealed shoulders)
- Reconstruction and overlay of the pavement along the existing alignment
- Correction and realignment of one horizontal curve at SLK 383
- Removal of some crests and dips by cutting the crests and filling up the depressions on this section of highway
- Removal and replacing of culverts and fixing table drains to meet drainage requirements
- Upgrade of intersections to meet restricted access vehicle (RAV) requirements
- Tie-in to intersections, private property access and rest areas/parking bays
- Extension of existing culverts where required due to formation widening
- Sealing of the rest area at SLK 387.

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

Action

Appendix 1.1 references the standard Principal Environmental Management Requirements (PEMRs) (Table's 1 to 9) that will be utilised for all Proposals that involve clearing to avoid, mitigate and manage the environmental impacts of the Proposal.

Proposal Specific Environmental Management Requirements are contained in Table 1.

Timeframes

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

Responsibilities

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

Appendix 1.1. Principal Environmental Management Requirements (PEMR's)

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 is required to be in line with MRWA Specification 301 (Hold Point 1 Clause 301.12) which requires the contractor to provide the pegged vegetation area shapefile prior to clearing. • MRWA Superintendent shall inspect pegged clearing line prior to release of hold point. • During clearing activities, conduct daily pre-start meetings with clearing crews to review and discuss approved clearing areas and controls.
Dieback Management	Refer to Table 2: Dieback 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.
Erosion and Sedimentation Control	Refer to Table 3: 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.

VMP Requirement	Standard Management Action	Specific Management Action
Fauna	Refer to Table 4: 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.
Machinery and Vehicle Management	Refer to Table 5: 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 6: 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 7: 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/	The pegged clearing line will be inspected by the MRWA Superintendent prior to clearing commencing in line with MRWA specification 301 (Hold Point 1 clause 301.12) that requires the Contractor to provide pegged vegetation area shapefile prior to clearing.
Water Drainage Management	Refer to Table 8: Water Drainage PEMR • Specification 204 Environmental Management • Construction Environmental Management Plan	Not Applicable.
Weed Management	Refer to Table 9: Weed Management PEMR	Not Applicable.

VMP Requirement	Standard Management Action	Specific Management Action
	• Specification 204 Environmental Management • Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	
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 • 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.

Table 1: Clearing PEMR

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 area 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: Dieback PEMR

STANDARD MANAGEMENT REQUIREMENTS
PRE WORKS 1. Contractor's Pre-starts must detail the requirements from the DMP/HMP, where relevant, dieback management areas and the requirements of each area, maps of infested and uninfected locations, and hygiene requirements 2. Where relevant a copy of the DMP/HMP must be onsite. This plan will include maps of management areas and obligatory control actions 3. Prescribe where vehicles, machinery and plant are going to be stored/parked during the works. 4. Use the Plant, Vehicle and Equipment Hygiene Checklist or equivalent Hygiene form to check that all machinery and vehicles are clean on entry (i.e. free of soil and vegetation).
DURING WORKS 1. If required, locations of dieback infested or dieback free areas and hygiene control locations marked on site in accordance with contract HMP or DMP. 2. Hygiene works to be undertaken as per the HMP or DMP, where required. 3. Restrict movement of machines and other vehicles to the Limits of Vegetation Clearing. 4. Ensure no known weed affected soil, mulch, fill or other material is brought into the Limits of Vegetation Clearing. 5. Ensure cleared materials are stockpiled or disposed at waste at the locations approved by the Superintendent.
POST WORKS 1. Record that the project was undertaken in dry soil conditions (unless an approved DMP authorises otherwise). 2. Use the Plant, Vehicle and Equipment Hygiene Checklist to check that all machinery and vehicles are clean on exit (i.e. free of soil and vegetation).

Table 3: Erosion and Sedimentation PEMR

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.
   - Prevent water and wind soil erosion within and adjacent to the works areas.
   - Prevent the sedimentation and siltation of watercourses located within and adjacent to the works area.
   - Ensure that sedimentation and siltation of drainage lines due to the removal of riparian vegetation is avoided, minimised and mitigated.
   - Ensure that loose surfaces and recently cleared areas are protected from wind and soil erosion.
   - Minimise exposed soil working surfaces or protect them from stormwater erosion.
   - Ensure material such as gravel, crushed rock and excavated material is stockpiled away from drainage paths and covered to prevent erosion.
   - Ensure that 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 4: Fauna PEMR

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 Superintendents approval of the management of active nests, burrows or dens 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 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 5: Machinery and Vehicle Management PEMR

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 is located within the Limits of Clearing and 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 suitably qualified and competent to undertake works, especially refuelling activities.
DURING WORKS 1. The Contractor must maintain records of checking all vehicles, machinery and plant are clean on entry.
POST WORKS

Table 6: Mulch and Topsoil Management PEMR

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

Table 7: Pegging and Flagging PEMR

PRE WORKS

1. Pegging must be done in accordance with the requirements detailed in Specification 301.
2. As per Specification 301, clause 12.1 Pre-clearing process, the relevant hold point can only be released when:
   - The pegging of Limits of Vegetation Clearing has been undertaken in accordance with Specification 204B and Specification 303
   - The Pegged Vegetation Clearing Area does not exceed the Limits of Vegetation Clearing
   - Mature trees have been conserved as far as practicable
   - The pegging of special environmental areas has been undertaken in accordance with Specification 204B and Specification 303C
   - The Pegged Vegetation Clearing Area data and pegged Special Environmental Area data has been sent to the Superintendent for approval at least five (5) days prior to clearing commencing
   - All pre-clearing weed control has been undertaken in accordance with Specification 204 and Specification 303
   - All pre-clearing fauna operational controls have been undertaken in accordance with Specification 204B and Specification 303C
   - All pre-clearing dieback operational controls have been undertaken in accordance with Specification 204B and Specification 303C
   - Suitable and unsuitable Topsoil zones have been identified in accordance with Table 301A.3
   - Vegetation and Topsoil stockpile locations that meet the requirements of Specification 204B and Specification 303C have been approved by the Superintendent
   - The locations of items to be demolished have been marked on Site
   - The locations of culverts have been verified in accordance with Specification 404
   - Waste disposal locations are in accordance with Specification 204B
   - Clearing required within three (3) metres (or the distance nominated by the Service Provider) of any service has been identified
   - All Clearing machinery is compliant with the controls in Specification 204 and Specification 303.
3. 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 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 remove and dispose of appropriately any demarcation, pegging or flagging once project works are completed.

Table 8: Water Drainage PEMR

PRE WORKS 1. Use pollution control and containment strategies for project activities in Public Drinking Water Source Areas (PDWSAs) / Underground Water Pollution Control Areas (UWPCAs) and liaise with the DWER where necessary
DURING WORKS 1. Existing natural drainage paths and channels along the road or the vicinity of the project area will not be unnecessarily blocked or restricted. 2. Temporary drainage systems may be installed to carry surface water away from the areas where excavation and foundation construction work is taking place or from any other area where the accumulation of water could cause delay or damage to the work. 3. Maintain these drainage systems in proper working order at all times. 4. Runoff from disturbed areas must be managed to minimise adverse impacts on surrounding vegetation, watercourses and properties. 5. Booms and silt fences must be used when working over or adjacent to areas of surface water in order to protect the quality of surface water from construction impacts.
POST WORKS 1. Water quality monitoring to be undertaken (if turbidity/ sedimentation is an issue). 2. Prior to backfilling the completed pipe work certify that the entire system is flushed clean and tested 3. Disturbed areas will be stabilised soon after construction activities are completed. 4. Culvert and drainage structures will be free of all grass, weeds, silt and debris

Table 9: Weed Management PEMR

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 diseased 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.