

Clearing Assessment Report – CPS 818

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Thomas Road Duplication and Roundabout Construction, Casuarina

August 2021

EOS No. 2003

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Amendments

Report Compilation & Review	Name and Position	Document Revision	Date
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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 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: Thomas Road Duplication and Roundabout Construction, Casuarina.

Proposal Purpose / Components:

- Duplication of Thomas Road between Straight Line Kilometre (SLK) 6.30 to 7.80, immediately east of the Kwinana Freeway off-ramp extending approximately 340 m east of Bombay Boulevard
- Construction of a new roundabout on Thomas Road with a central island radius of 52 m
- Construction of two crossovers south of Thomas Road to a new residential development (developer responsible for constructing the access roads).

The proposed clearing undertaking using CPS 818 is: Up to 1.80 ha native vegetation within a total Proposal Area of 8.13 ha.

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

Proposal Location(s): The Proposal Area is located on Thomas Road from SLK 6.30 to 7.80, within the suburb of Casuarina, City of Kwinana, approximately 25 km south of Perth central business district (CBD).

115.857981, -32.229731 Decimal Degrees

Refer to Figure 1 which shows the Proposal Area, Development Envelope, Survey area and Contextual area. Refer to Figure 2 which shows the Development Envelope in relation to the Study area.

2.2 Assessment Report Scope

Table 1 below defines terminology used throughout this report.

Table 1. Report	terminology, spatial scale and	d survey sco	pe	
Report Terminology	Definition	Size (ha)	Flora Survey	Fauna Survey
Proposal Area	Represents the maximum construction impact footprint in which up to 1.80 ha native vegetation will be removed.	8.13	 Biota (2021): Detailed two-phase flora and vegetation survey. Targeted significant flora searches. 	 Biota (2021): Targeted black cockatoo survey. Low intensity conservation significant
Development Envelope	Boundary surrounding the proposal within which all development will be contained.	21.6	Threatened and Priority Ecological Community (TEC and PEC) assessment and	fauna survey.
Survey Area	The area sampled during the survey. Consists of a 300 m wide corridor that will accommodate the proposal.	46.1	mapping.	
Contextual Area	A 500 m buffer around the Survey Area.	253.8	Biota (2021): • Extrapolated vegetation mapping. • Extrapolated TEC/PEC mapping.	Biota (2021): • Extrapolated fauna habitat mapping.
Study Area	A 5 km buffer around the Survey Area.	9,608.4	 Desktop information gath literature sources 	nered from database and





2.3 Alternatives to clearing

The proposal involves duplication of an existing road and associated linear infrastructure. The design has been modified, and contained within the road reserve, as much as possible to reduce earthworks and clearing of native vegetation.

Road construction material and water will be sourced off-site. Temporary access tracks, construction storage, and storage/stockpile locations have been contained within the Proposal Area to minimise or avoid any unnecessary clearing of vegetation.

Large trees will be retained and only large shrubs or small trees will be removed as part of the proposal activities.

Refer to Table 2 which summarises how clearing impacts have been avoided and minimised.

Design or Management Applied to **Discussion and Justification Current Design** Measure The design has sought to reduce earthworks as much as possible to minimise earthworks (fill height/cut depth) in areas of significant vegetation. Steepening of batters was not possible in some areas due to the large design level **Steepen batter slopes** difference from the road to adjacent properties. In order to sufficiently steepen the batter to eliminate clearing and No acquisition of private land, a 2 m high retaining wall would have been required which was not feasible or achievable for this proposal. Batter slopes have been designed to avoid the need of safety barriers in this design. Clearing of vegetation and Installation of safety ground disturbance has been maintained within the road reserve as much as possible. Should barriers be used, the No shoulder would need to be extended by 1 m to allow for barriers and the batter slope could be shortened by barriers approximately 1.5 m. The cost/benefit ratio does not warrant the use of safety barriers for this design. The proposal design requires use of the entire Main Roads road reserve on both sides. Minor land acquisition will Alignment to one side of be required beyond the road reserve in some instances. The design does not allow for the alignment to be located No existing road on only one side of the existing road; duplication of the existing road requires the entire road reserve corridor. Alternative alignment to follow existing road (or) The proposal is primarily located within the existing road reserve. Some minor land acquisition outside the road to preferentially locate reserve is required. Impact to adjacent native vegetation and environmental aspects have been minimised by the Yes current design remaining mostly within the road reserve and widening the existing alignment. within pasture or a degraded areas Installation of Yes Kerbing has been considered and implemented in the design where possible. kerbing Simplification of design Traffic volumes, road safety and future residential and commercial demands within the vicinity of the Proposal Area have influenced the proposal design. The new roundabout will provide access to new commercial and residential to reduce number of Yes lanes and/or complexity developments alongside Thomas Road, and is consistent with the ultimate plan for a dual carriageway between the Kwinana Freeway and Anketell Road. of intersections Preferential use of existing cleared areas for Temporary access tracks, construction storage, and storage/stockpile locations have been contained within the access tracks. Yes Proposal Area, away from native vegetation as much as possible.

Table 2. Measures undertaken to Avoid, Minimise, Reduce and Manage the Proposal Clearing Impacts

construction storage and

stockpiling

Design or Management Measure	Applied to Current Design	Discussion and Justification
Drainage modification	Yes	Drainage is being upgraded throughout the Proposal Area to maintain existing flow lines/watercourses and to minimise impact to adjacent native vegetation. A combination of open B-drains and installation of pit and pipe will be constructed to improve drainage. Areas of open drain will be constructed in locations where there is minimal native vegetation, while pit and pipe installation will be constructed in more sensitive areas to minimise clearing of native vegetation.

2.4 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 510 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
- Aboriginal Heritage Act 1972 (WA)
- Town Planning and Development Act 1928

Environmental Protection Policies

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

Other Relevant policies and guidance documents:

- Environmental Offsets Policy (Government of Western Australia, 2011)
- A guide to the assessment of applications to clear native vegetation (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

Main Roads engaged Biota to undertake a detailed biological survey during spring 2020 which included a two-phase flora and vegetation survey, targeted flora searches, a targeted Banksia Woodlands of the Swan Coastal Plain TEC survey, targeted black cockatoo habitat assessment and low intensity significant fauna survey. The survey aligned with State and Commonwealth requirements for the bioregion, species and communities present. Survey methodology was consistent with State guidelines, technical guides and Commonwealth survey guidelines for the relevant threatened and significant species.

The survey recorded six native vegetation units:

- B1: Banksia over Kunzea and Melaleuca
- B2: Banksia over Calytrix and Macrozamia with Lyginia
- E1: Eucalyptus with Melaleuca over Astartea and Lepidosperma
- E2: Eucalyptus over Acacia with Pteridium and Lepidosperma
- K1: Scattered Kunzea over Lyginia
- K2: *Kunzea* tall scrub.

A further two vegetation units included areas previously cleared for construction of the Kwinana Freeway that were subsequently planted (M1 *Melaleuca* and *Acacia* over *Eragrostis* and M2 *Melaleuca* and *Acacia* with occasional *Eucalyptus todtiana*). Other areas included 'Isolated trees over previously cleared or pasture' and land completely cleared for a range of purposes (commercial, residential, roads etc.). The majority (52%) of the Survey Area was cleared, with areas of native vegetation varying in condition from Completely Degraded (11%), Degraded (13.9%), Good (5.6%), Very Good (9.2%), Very Good to Excellent (3.8%) to Excellent (4.5%).

The survey found 6.83 ha of Federally listed Banksia woodlands of the Swan Coastal Plain TEC within the Survey Area (and 28.93 ha within the Contextual Area). This included the following DBCA listed PECs:

- Priority 3 'Low-lying *Banksia attenuata* woodlands or shrublands' (floristic community type 21c) 2.09 ha; and
- Priority 3 'Banksia woodlands of the Swan Coastal Plain'; represented by floristic community type 21a 4.74 ha.

No State or Federally listed Threatened flora species were found in the Survey Area. Two DBCA listed priority flora species were found within the Survey Area:

- Jacksonia gracillima (P3) two individuals within B1.
- Caladenia speciosa (P4) one individual within B2.

Three fauna habitat types were identified in addition to cleared/modified land: Banksia woodland, Eucalypt woodland and low shrubland. One State listed priority 4 species Quenda (*Isoodon fusciventer*) was confirmed as present during the field survey. Three significant fauna species are considered likely to occur: Carnaby's Cockatoo (EN), Forest Red-tailed Black Cockatoo (VU) and Perth Lined Slider (P3); with a further three fauna species considered to may potentially occur: Baudin's Cockatoo (EN), Chuditch (VU), Black-striped Snake (P3), Western Brush Wallaby (P4) and graceful Sunmoth (P4).

Black cockatoo habitat assessment identified 18 trees with diameter at breast height (DBH) > 50 cm, with no hollows considered suitable for black cockatoo nesting. One of these trees is within the Proposal Area.

3.2 Dieback survey

Woodman Environmental Consulting completed a dieback survey (2021) for the proposal, including a 50 m buffer, to determine the dieback status of the area. The dieback survey was undertaken by members accredited by DWER in the detection, diagnosis and mapping of the dieback disease.

A single Phytophthora dieback infestation, comprising 0.16 ha was mapped in the dieback survey area. An uninfested area comprising 0.78 ha was also mapped within the survey area. A further 2.91 ha of the dieback survey area was found to be uninterpretable, of which 1.58 ha was mapped as unprotectable. An additional 0.95 ha of temporarily uninterpretable vegetation was also mapped. The remaining 19.75 ha of the dieback survey area was excluded from the assessment due to being degraded or devoid of vegetation.

4 VEGETATION DETAILS

4.1 Proposal Site Vegetation Description

Information detailed within Tables 3 and 4 below are derived from Government of Western Australia Statewide Vegetation Statistics (2018). Table 5 data has been obtained from Heddle (1980) and Mattiske (1998) vegetation complex mapping.

Table 3. Summary of Proposal Area's Mapped Pre-European Vegetation Associations

Pre-European Vegetation Association(s)	Clearing Description	Vegetation Condition
Vegetation Association 1001 described as a Medium very sparse woodland; jarrah, with low woodland; banksia & casuarina (Government of Western Australia, 2018).	Clearing of up to 1.80 ha for road duplication, installation of roundabout and two crossovers on Thomas Road, Casuarina.	Completely Degraded to Excellent (Biota 2021)

Table 4. Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale:	Pre– European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Veg Assoc No. 1001	Statewide	57,410	12,660	22.05	3.13
	IBRA Bioregion Swan Coastal Plain	57,410	12,660	22.05	3.13
	IBRA Sub-region Perth	57,410	12,660	22.05	3.13
	Local Government Authority City of Kwinana	4,694	1,745	37.18	0.73

4.2 Vegetation Complexes and Representation

Table 5. Vegetation complexes (Heddle/Mattiske) within the Proposal Area

Heddle/Mattiske Veg Complex	Pre-European Extent (ha)	2018 Vegetation Extent	% Remaining
Bassendean Complex-Central and\South	87,476	23,508	26.87

4.3 Vegetation Units

A detailed biological survey was undertaken by Biota in spring 2020 (Biota 2021) which included quadrat sampling, mapping of vegetation types and vegetation condition. Refer to Table 6 which lists the vegetation units identified in the Survey Area, Contextual Area and Proposal Area. For further information about Biota (2021) survey, refer to Section 3.1.

Table 6. Vegetation Units within the Survey Area, Contextual Area and Proposal (Biota 2021)

Vegetation Description	Survey Area (ha)	Contextual Area (ha)	Proposal Area (ha)	Vegetation Condition			
Vegetation Units							
Banksia over Kunzea and Melaleuca	4.7	9.8	0.33	Good			
Banksia over Calytrix and Macrozamia with Lyginia	2.1	18.8	0.08	Degraded-Excellent			
<i>Eucalyptus</i> with <i>Melaleuca</i> over <i>Astartea</i> and <i>Lepidosperma</i>	1.3	34.3	0.25	Degraded			
<i>Eucalyptus</i> over <i>Acacia</i> with <i>Pteridium</i> and <i>Lepidosperma</i>	1.2	12.5	0.28	Degraded-Very Good-Excellent			
Scattered Kunzea over Lyginia	0.8	1.2	0.00	Completely Degraded-Very Good			
Kunzea Tall Scrub	4.4	10.8	0.61	Degraded-Good			
Isolated Trees over Previously Cleared or Pasture	5.1	30.2	0.25	Completely Degraded			
Total Native Vegetation	16.9	94.9	1.80				
Other							
Planted <i>Melaleuca</i> and <i>Acacia</i> over <i>Eragrostis</i>	1.1	2.7	0.05	Degraded			
Planted <i>Melaleuca</i> and <i>Acacia</i> with occasional <i>Eucalyptus todtiana</i>	1.3	4.8	0.18	Degraded			
Commercial/Residential Mixed Land Use	3.8	60.9	0.40	Not applicable			
Cleared/Regrowth	16.1	51.6	2.88	Not applicable			
Roads and Rail Infrastructure	4.1	15.7	2.80	Not applicable			

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).

The proposed clearing is at variance to Clearing Principles (a), (b) and (f) and may be at variance to Clearing Principle (h).

Comments	Proposed clearing is at variance to this Principle
	The Proposal Area comprises native vegetation, modified and cleared areas. The proposal will impact up to 1.80 ha of native vegetation ranging from Completely Degraded to Excellent condition, with 79% of the total quantity of native vegetation to be cleared being in Completely Degraded to Degraded condition (Biota 2021).
	Detailed flora survey did not identify any flora species listed as Threatened under the EPBC Act or BC Act within the Survey Area (Biota 2021). Two State-listed Priority species were recorded within the Survey Area, namely <i>Jacksonia gracillima</i> (Priority 3) and <i>Caladenia speciosa</i> (Priority 4) however these will not be impacted by the proposal. Four Threatened orchid species were identified as potentially occurring in the Survey Area: <i>Caladenia huegelii</i> , <i>Diuris micrantha</i> , <i>Diuris purdiei</i> , and <i>Drakaea elastica</i> . However, targeted orchid surveys did not identify any Threatened orchid species (Biota 2021).
	6.83 ha of Federally listed Banksia woodlands of the Swan Coastal Plain TEC was identified within the Survey Area and 28.93 ha within the Contextual Area (Biota 2021). This included the following DBCA listed PECs:
	 Priority 3 'Low-lying Banksia attenuata woodlands or shrublands' (floristic community type 21c) – 2.09 ha; and Priority 3 'Banksia woodlands of the Swan Coastal Plain'; represented by floristic community type 21a – 4.74 ha.
	No State listed TECs were recorded in the Survey Area.
	The proposal will impact 0.41 ha Banksia Woodlands TEC/PEC, in Degraded to Excellent condition (Biota 2021).
	Biota (2021) identified three fauna habitats in the Survey Area (Eucalypt Woodland, Banksia Woodland, and Low Shrubland), all of which are well represented throughout the Contextual Area and surrounds.
	The Quenda (<i>Isoodon fusciventer</i>) (Priority 4) was the only conservation significant fauna species recorded during the survey. However, the following fauna species were assessed as Likely to occur or May occur:
	 Carnaby's Cockatoo, <i>Calyptorhynchus latirostris</i> (Endangered BC Act & EPBC Act); Baudin's Cockatoo, <i>Calyptorhynchus baudinii</i> (Endangered BC Act & EPBC Act); Forest Red-tailed Black Cockatoo (FRTBC), <i>Calyptorhynchus banksii naso</i> (Vulnerable BC Act & EPBC Act);
	 Chuditch, <i>Dasyurus geoffroii</i> (Vulnerable BC Act & EPBC Act); Western Brush Wallaby, <i>Notamacropus irma</i> (Priority 4 BC Act);
	 Graceful Sunmoth, Synemon gratiosa (Priority 4 BC Act); Perth Lined Slider, Lerista lineata (Priority 3 BC Act); and
	Black-striped Snake, <i>Neelaps calonotos</i> (Priority 3 BC Act).
	No evidence of black cockatoo breeding, roosting or feeding was recorded within the Survey Area and the proposal. However, black cockatoos and feeding evidence was recorded adjacent to the Survey Area and roosting sites are known to occur within the Contextual Area.

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

	The north-western and north-eastern portions of the proposal are mapped as ESAs. The ESAs are likely to be associated with Bush Forever site 270 (Sandy Lake and Adjacent Bushland, Anketell), Priority 2 Public Drinking Water Source Area and Conservation Category Wetlands (UFIs 13080 and 6721, both Sumplands).
	No impact to the gazetted Bush Forever site 270 will occur as a result of the proposal (land acquisition to be completed prior to works commencing). Any potential impact to adjacent Bush Forever sites will be managed through the implementation of management strategies outlined in the Construction Environmental Management Plan (CEMP).
	Whilst the proposal will result in the loss of up to 1.80 ha native vegetation, the vegetation does not comprise high biological diversity in the local or regional context. The proposal involves clearing from within a narrow linear section of vegetation that has been historically disturbed from road construction and maintenance, and extensively exposed to edge effects and adjacent residential and commercial development. The Contextual Area and wider surrounds will retain large areas of similar native vegetation in good or better condition.
	Based on the above, the proposed clearing has been determined to be at variance to this Principle.
Methodology	Beeston (2002)
	Biota (2021)
	DBCA shapefiles
	Main Roads GIS Shapefiles
	Department of Natural Resources and Environment (2002)
	EPA (2016)
	Government of WA (GoWA) (2021)
	Natural Resource Management SLIP Soil Systems (Accessed February 2021)

(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 at variance to this Principle
	The biological survey (Biota 2021) identified three fauna habitats in the Survey Area (Eucalypt Woodland, Banksia Woodland, and Low Shrubland), all of which are well represented within the Contextual Area and surrounds.
	 The Quenda (<i>Isoodon fusciventer</i>) (Priority 4) was the only conservation significant fauna species recorded during the survey. However, the following fauna species were assessed as Likely to occur or May occur: Carnaby's Cockatoo, <i>Calyptorhynchus latirostris</i> (Endangered BC Act & EPBC Act); Baudin's Cockatoo, <i>Calyptorhynchus baudinii</i> (Endangered BC Act & EPBC Act); FRTBC, <i>Calyptorhynchus banksii naso</i> (Vulnerable BC Act & EPBC Act); Chuditch, <i>Dasyurus geoffroii</i> (Vulnerable BC Act & EPBC Act); Western Brush Wallaby, <i>Notamacropus irma</i> (Priority 4 BC Act); Graceful Sunmoth, <i>Synemon gratiosa</i> (Priority 3 BC Act); and Black-striped Snake, <i>Neelaps calonotos</i> (Priority 3 BC Act).
	Biological survey did not identify the above listed fauna species within or adjacent to the proposal (Biota 2021). The likelihood of occurrence was determined based on a desktop

study of historical surveys and DBCA spatial records (Biota 2021). Given the proposal requires clearing of 1.80 ha native vegetation in predominantly Completely Degraded and Degraded condition, adjacent to an already existing road in close proximity to substantial areas of good or better quality remnant vegetation, the vegetation proposed to be removed is unlikely to be necessary for the maintenance of the above listed fauna species.

Quenda occupies a range of habitats, typically with dense ground cover. The loss of up to 1.80 ha of potential Quenda habitat is unlikely to significantly reduce local populations of this species given that a large proportion of the vegetation within the proposal is Degraded, and extensive suitable habitat for Quenda, in better condition, is available within the surrounding conservation reserves.

One black cockatoo habitat tree (DBH >50 cm) with no hollows will be impacted by the proposal. The proposal involves clearing up to 0.43 ha Carnaby's Cockatoo and Baudins's Cockatoo foraging habitat, and 0.21 ha FRTBC foraging habitat (based on habitat assessment by Biota 2021; refer to table below for breakdown). This foraging habitat ranges in condition from low to high quality. The key black cockatoo foraging habitat in the area is Banksia Woodland, with 6.8 ha and 28.6 ha recorded in the Survey Area and Contextual Area respectively, and with only 0.41 ha of it to be impacted by the proposal.

		Black Cockatoo Foraging Habitat Within Proposal Area				
	Habitat Type	Baudin's Black	Carnaby's Black	Red-tailed Black		
		Cockatoo	Cockatoo	Cockatoo		
	Banksia	0.41 ha	0.41 ha	0.005 ha		
	Woodland	Any banksia woodland	Any banksia	Limited to one Jarrah in		
		within the Proposal Area	woodland within the Proposal Area	the Proposal Area.		
	Low Shrubland	Nil	Nil	0.188 ha Limited to Blackbutt that was only recorded in PM(M2) vegetation unit.		
	Eucalypt Woodland	* Nil	* Nil	* Nil		
	Cleared or	0.02 ha	0.02 ha	0.02 ha		
	modified	Limited to potential	Limited to potential	Limited to potential Marri		
		Marri trees within vegetation unit "Isolated	Marri trees within vegetation unit	trees within vegetation unit "Isolated trees over		
		trees over Previously Cleared or Pasture".	"Isolated trees over Previously Cleared or Pasture".	Previously Cleared or Pasture".		
	Total	0.43 ha	0.43 ha	0.21 ha		
	* Wetland type value by Biota (2	Eucalypt Woodland assess 2021).	ed as having nil black o	cockatoo foraging habitat		
	No evidence of l	olack cockatoo breeding, re	posting or feeding was	recorded within the Survey		
	Area. However, Area and roostir	black cockatoos and feedi ng sites are known to occu	ng evidence was record r within the Contextua	ded adjacent to the Survey I Area.		
	Therefore, proportion the importance the proximity to 2021).	osed clearing has been de of Banksia food resource a known roost and other	termined to be at varia s on the Swan Coastal r black cockatoo record	nce to this Principle, given Plain for black cockatoos, ds in the local area (DWER		
Methodology	Biota 2021 DBCA Shapefiles	5				

DoEE 2021
Main Roads GIS Shapefiles

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

Proposal is not likely to be at variance to this Principle
Four Threatened orchid species were identified as potentially occurring in the survey area: <i>Caladenia huegelii, Diuris micrantha, Diuris purdiei,</i> and <i>Drakaea elastica</i> .
A targeted survey was undertaken for <i>D. elastica</i> on August 25, 2020 by Biota senior botanists. Suitable habitat pertaining to the species was searched utilising transects surveyed at approximately 5-10 m spacings. Habitat targeted included vegetation fringing winter-wet and wetland areas that include <i>Kunzea glabrescens</i> . <i>Drakaea elastica</i> habitat within the Survey Area was considered marginal habitat generally due to the vegetation condition including the presence of perennial and annual weeds in the understory. Patches of typically bare sand were also targeted within the appropriate habitat for this species.
A targeted survey for <i>Caladenia huegelii</i> , <i>Diuris micrantha</i> , and <i>Diuris purdiei</i> was undertaken in prospective Banksia woodland vegetation units within the Survey Area. The survey was undertaken on September 7 and 25, 2020 (Biota 2021). Similarly, parallel transects were surveyed at 5-10 m spacings within suitable habitat. All <i>Caladenia</i> species similar in appearance to <i>Caladenia huegelii</i> were recorded and photographed.
Orchid identification texts, reference images, and assistance from Andrew Brown (ex-DBCA) and Mark Brundrett (UWA) with identification of images, were used to determine any potential orchid species of conservation significance (Biota 2021).
The targeted orchid surveys did not identify any Threatened orchid species. Further, no other Threatened flora species have been recorded or are considered likely to occur in the Survey Area (Biota 2021).
Given the above, the proposed clearing is not likely to be at variance to this Principle.
Biota 2021
DBCA shapefiles
DSEVVPAC 2012 Florabase 1998

(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
	No State listed TECs were recorded in the Survey Area or are considered likely to occur (Biota 2021).
	Given the above, the proposed clearing is not at variance to this Principle.
Methodology	Biota 2021
	DBCA shapefiles

Comments	Proposed clearing is not likely to be at variance to this Principle			
	The proposal consists of native vegetation, modified and cleared areas. The proposal comprises 1.80 ha of native vegetation ranging from Completely Degraded to Excellent condition, with 79% of the total quantity of native vegetation to be cleared being in Completely Degraded to Degraded condition (Biota 2021).			
	The proposal is considered to occur within a "constrained" area and therefore the retention objective for determining whether vegetation is under-represented is 10%. Vegetation association number 1001 has 22.05% pre-European vegetation remaining within the Swan Coastal Plain IBRA bioregion (see Table 4 in Section 4.1) and therefore is not considered significant as a remnant of native vegetation.			
	The Mattiske vegetation complex, Bassendean Complex Central and South, has 26.87% remaining (see Table 5 in Section 4.2) and therefore is not considered significant as a remnant of native vegetation.			
	Biota (2021) mapped vegetation units in the Survey Area and Proposal Area, whilst vegetation mapping within the Contextual Area was based on extrapolation of those units identified within the Survey Area (see Table 6 in Section 4.3).			
	Proposed clearing of 1.80 ha native vegetation represents 1.7 % of the vegetation within the Contextual Area, with a large proportion of the vegetation within the Proposal and Contextual Areas surveyed as Completely Degraded and Degraded condition. No patches of vegetation within the Survey Area were considered to have a Pristine condition ranking.			
	The proposal comprises duplication and upgrade of an already existing road. The vegetation proposed to be cleared is highly degraded and modified, has been extensively cleared, and is not considered significant as a remnant of native vegetation. Therefore, the proposal is considered not likely to be at variance to this Principle.			
Methodology	Aerial photography			
	Biota 2021			
	Government of Western Australia 2018			
	Heddle 1980 Matticka 1998			
	Parth Biodiversity Proposal 2013			

(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.

(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
	 According to available databases and Biota (2021), a number of geomorphic wetlands intersect the proposal as follows: Multiple Use Wetland (MUW) UFI 15938 - Dampland MUW UFI 6668 - Sumpland MUW UFI 6669 - Sumpland Resource Enhancement Wetland (REW) UFI 15935 - Dampland REW UFI 6667 - Dampland

The proposal also intersects the mapped extent of Conservation Category Wetland UFI 6721 (sumpland), however this wetland has been cleared. No clearing of vegetation growing in association with a conservation category wetland will be undertaken as part of the proposal.

The below table summarises the area and condition of vegetation within geomorphic wetlands within the Proposal Area –

Management Category	Wetland Vegetation within Proposal Area (ha)	Vegetation Condition within Proposal Area (Biota 2021)
MUW	1.01	Completely Degraded-Good
REW	0.57	Completely Degraded-Good

In total, there is 1.59 ha of wetland vegetation in the proposal area. The remaining areas where these geomorphic wetlands intersect the proposal are disturbed/modified and associated with the past construction of Thomas Road. Where vegetation occurs in the proposal area, it is patchy or sparse and mostly in a Completely Degraded condition.

The proposal intersects a very small portion of the local wetlands. The area (ha) of geomorphic wetlands intersected by the wider Survey Area and Contextual Area are summarised in the below table -

Management Category	Survey Area (ha)	Contextual Area (ha)
MUW	18.5	61.3
CCW	9.4	57.5
REW	5.7	38.3

Biota (2021) found that the wetland vegetation present within the Survey Area represents FCTs 4, 5, 11 that are well reserved on the Swan Coastal Plain, are not rare regionally and have a low risk conservation status assigned to them.

Gibbs Road Swamp System, a nationally important wetland, is located 5.7 km north of the proposal and Spectacles Swamp (Bush Forever site 269), also a nationally important wetland, is located 600 m west of the proposal. There are no direct surface drainage lines connecting the proposal to Gibbs Road Swamp System and groundwater flow direction from the proposal is westward away from the Swamp system. Groundwater flow from the proposal is westward toward Spectacles Swamp; however, since the proposal is not expected to alter the existing hydrological regime, no direct or indirect impacts to Gibbs Road Swamp System or Spectacles Swamp are anticipated.

The proposal contains 1.59 ha vegetation growing in, or in association with wetlands in Completely Degraded to Good condition. Noting the small extent of the proposed clearing and its linear shape, the proposed clearing is not likely to have a significant impact upon wetland vegetation or associated environmental values. The proposed road works will upgrade existing drainage through the installation of open B-drains and installation of pit and pipe drainage infrastructure, however are not expected to significantly change the existing hydrological regime.

Overall, since the proposal requires clearing of native vegetation growing in association with a watercourse and wetland, the proposal is at variance to this principle, however the impacts are expected to be minor.

MethodologyBiota 2021DWER and DBCA shapefiles

Comments	Proposed clearing is not likely to be at variance to this Principle			
	 Review of Natural Resource Management SLIP Soil Systems confirms the proposal is situated within three mapped soil types as follows: Bassendean B1 Phase subsystem: Described as extremely low to very low relief dunes, undulating sandplain and discrete sand rises with deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic hardpan at depths generally greater than 2 m; banksia dominant (26.9% of the proposal) Bassendean B3 Phase subsystem: Described as closed depressions and poorly defined stream channels with moderately deep, poorly to very poorly drained bleached sands with an iron-organic pan, or clay subsoil. Surfaces are dark grey sand or sandy loam (32.8% of the proposal) Bassendean B6 Phase subsystem: Described as sandplain and broad extremely low rises with imperfectly drained deep or very deep grey siliceous sands (41% of the proposal). 			
	All three of the mapped soil units are sandy soil types, which are highly susceptible to wind erosion. To minimise the risk of wind erosion, Main Roads will undertake construction activities within two months of the date of clearing. This will prevent the prolonged exposure of bare sandy soils. Erosion will also be managed through the implementation of management strategies outlined in the CEMP.			
	According to SLIP Water Erosion Risk mapping the centre portion of the proposal has a 30- 50% risk of water erosion and flooding. The majority of the proposal is mapped within an area of low risk of water erosion and flooding. Surface water management measures will be implemented as part of proposal design to maintain existing flow lines/watercourses and to avoid impact to adjacent native vegetation. A combination of open B-drains and installation of pit and pipe will be constructed to improve drainage. Areas of open drain will be constructed in areas where there is minimal native vegetation, while pit and pipe installation will be constructed in more sensitive areas to minimise clearing of native vegetation. The proposal has a low likelihood of water erosion as a result of the proposed clearing, given the presence of highly permeable sandy soils which typically have high infiltration rates.			
	The proposal is not likely to be at variance to this principle.			
Methodology	Natural Resource Management SLIP Soil Systems and Water Erosion Risk mapping (Accessed 09/02/2021)			

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

(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 may be at variance to this Principle
	Large tracts of Bush Forever sites surround the proposal, with the closest conservation area being Bush Forever site no. 270 known as 'Sandy Lake and adjacent bushland, Anketell'. A portion of this Bush Forever site is also a DBCA managed land zoned Parks and Recreation under the Metropolitan Region Scheme.
	No direct impact to the gazetted Bush Forever site or other conservation areas will occur as a result of the proposal (land acquisition to be completed prior to works commencing). Potential indirect impacts can be avoided through implementation of Main Roads standard environmental management measures.

	The proposed small-scale linear clearing along an existing road will not impact on ecological linkages between local conservation areas, particularly as significant areas of remnant native vegetation adjacent to the road reserve will remain.
	It has been determined the project may be at variance with this Principle as it may have an impact on the environmental values of Bush Forever Area 270 (Sandy Lake and adjacent bushland, Anketell) and Department of Biodiversity, Conservation and Attractions (DBCA) Legislated Tenure (1758/697), assigned as Department Managed Crown Freehold and in freehold by the Planning Commission. However, with the implementation of the weed and dieback management measures proposed it has been determined that no offset is required to counterbalance the loss of native vegetation associated with these conservation areas (DWER 2021).
Methodology	Biota 2021 DBCA shapefiles EPA (2016)

(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			
	The proposal is located within a Priority 2 PDWSA namely Jandakot Underground Water Pollution Control Area. Priority 2 areas are normally assigned over rural land and are managed to minimise water quality risks. Low to medium intensity activities such as rural lifestyles and grazing can occur. As no dewatering is proposed as part of construction of the proposal and the scale of proposed clearing is minor and linear in nature, impact to groundwater quality is unlikely. The proposal occurs within a number of geomorphic wetlands that are hydrologically connected to a suite of wetlands surrounding the proposal. Geomorphic wetlands intersected by the Survey Area, Contextual Area and Proposal Area are summarised in the below table -			
	Management	Survey Area	Contextual	Wetland Vegetation
	Category	(ha)	Area (ha)	within Proposal Area (ha)
	MUW	18.5	61.3	1.01
	REW	5.7	38.3	0.57
	CCW	9.4	57.5	0.00
	Gibbs Road Swamp System, a nationally important wetland, is located 5.7 km north of the proposal and Spectacles Swamp (Bush Forever site 269), also a nationally important wetland, is located 600 m west of the proposal. There are no direct surface drainage lines connecting the proposal to Gibbs Road Swamp System and groundwater flow direction from the proposal is westward away from the Swamp system. Groundwater flow from the proposal is westward toward Spectacles Swamp; however, since the proposal is not expected to alter the existing hydrological regime, no direct or indirect impacts to Gibbs Road Swamp System or Spectacles Swamp is anticipated. The proposal is located in an area that is highly disturbed and degraded as a result of the existing road, and directly and indirectly impacted by commercial development occurring immediately south of the proposal.			

	Vegetation clearing and construction activities associated with the proposal have potential to result in increased sediment load into the wetland areas thereby potentially impacting the quality of surface water. However, no actual impacts are expected since the proposal: Involves upgrade to an already existing road
	 Involves retention of densely vegetated areas immediately north and south-east of the proposal
	 Will result in the improvement to existing drainage infrastructure and hydrological regimes as a result of the installation of open B-drains and the installation of pit to pipe drainage
	Comprises soil types that are sandy and well-drained.
	 Involves implementation of additional management measures (e.g. silt fences) as need be.
	Based on the above, the clearing associated with the proposal is unlikely to cause
	deterioration in the quality of surface and/or underground water. Therefore, the proposal
	is not likely to be at variance to this principle.
Methodology	Biota 2021
	DWER and DBCA shapefiles
	GoWA 2021

(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
	Surface water management measures will be implemented as part of proposal design to maintain existing flow lines/watercourses and to avoid impact to adjacent native vegetation. A combination of open B-drains and installation of pit and pipe will be constructed to improve drainage. Areas of open drain will be constructed in areas where there is minimal native vegetation, while pit and pipe installation will be constructed in more sensitive areas to minimise clearing of native vegetation.
	As described under clearing principle (g) the proposal is situated in an area comprised of mostly well drained sandy soils which are highly permeable and typically have high infiltration rates. The proposal is located in a region that experiences moderate rainfall (900 millimetres per annum) with vegetation condition that is largely Degraded (Biota 2021). These factors would not result in clearing being likely to cause, or exacerbate, the incidence or intensity of flooding. Therefore, proposed clearing is not likely to be at variance to this Principle.
Methodology	Biota 2021
	Natural Resource Management SLIP Soil Systems and Water Erosion Risk mapping (Accessed 09/02/2021)

6 ADDITIONAL ACTIONS REQUIRED

Table 7 summarises what further pre-clearing impact assessment and vegetation management is required in accordance with CPS 818.

Table 7	7 С	of Additional	Management	Actions De	and here	CDC 010
lable l	. Summary	of Additional	management	ACTIONS RE	iquirea by	CP3 010

Impact of Clearing	Yes/No or NA	Further Action Required			
 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	Submissions will be sought from relevant parties, including the LGA, in accordance with Condition 8 of CPS 818/15 published on the website. A VMP has been completed, refer to Appendix A. Main Roads will be seeking an exemption from DWER to implement an offset for variance to clearing principle (f). Main Roads commissioned a wetland assessment which determined that the potential for impacts on significant wetland areas in the local area and adjacent to the proposal is considered low.			
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).	Νο	No further action required.			
 4 a. 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 	Yes	Comply with Dieback Management Plan Comply with the Dieback Management Process D21#290657.			

Impact of Clearing	Yes/No or NA	Further Action Required
 Works have potential for uninfested areas to be impacted 		
4b. Does the proposed works require clearing within or adjacent to DBCA estate in non-dry conditions?	Yes	Comply with Dieback Management Plan Comply with the Dieback Management Process D21#290657.
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	Νο	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	Νο	No further action required.

7 STAKEHOLDER CONSULTATION

Main Roads has undertaken stakeholder consultation in accordance with CPS 818/15 Condition 8. One submission was received.

Organisation	Outcome of Consultation	Consultation Date
Department of Biodiversity,	DBCA requested that adequate weed control be	2 July 2021
Conservation and	implemented to prevent incursion of weed seed to	
Attractions(DBCA)	Jandakot Regional Park and flagging to ensure no	
	clearing of adjacent DBCA managed estate (Lot8)	

8 VEGETATION MANAGEMENT

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

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10 APPENDICES

Appendix	Title
Appendix A	Vegetation Management Plan

Appendix A: Vegetation Management Plan

THOMAS ROAD DUPLICATION AND ROUNDABOUT CONSTRUCTION

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 Thomas Road Duplication and Roundabout Construction proposal.

Scope of proposal as follows:

- Duplication of Thomas Road between Straight Line Kilometre (SLK) 6.30 to 7.80, immediately east of the Kwinana Freeway off-ramp extending approximately 340 m east of Bombay Boulevard
- Construction of a new roundabout on Thomas Road with a central island radius of 52 m
- Construction of two crossovers south of Thomas Road to a new residential development (developer responsible for constructing the access roads).

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 2.1 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 9.

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 A.1: Vegetation Management

Table 9. Project Specific Environmental Management Requirements

VMP Requirement	Standard Management Action	Specific Action	Management
Clearing	Refer to Table 10: Clearing PEMR	Not Applicat	ole.
	 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 <u>https://www.mainroads.wa.gov.au/technical- commercial/tender-preparation/</u> 		
Dieback	Refer to Table 11: Dieback PEMR	Comply with	Dieback
Management	 Specification 204 Environmental Management Construction Environmental Management Plan Contract Tender Documents available at <u>https://www.mainroads.wa.gov.au/technical-</u> <u>commercial/tender-preparation/</u> 	Managemen D21#290657	t Plan '.
Erosion and	Refer to Table 12: Erosion and Sedimentation	Avoid sedim	entation and
Sedimentation	Control PEMR	erosion into	adjacent
Control	 Specification 204 Environmental Management Construction Environmental Management Plan Contract Tender Documents available at <u>https://www.mainroads.wa.gov.au/technical-</u> <u>commercial/tender-preparation/</u> 	sensitive wet	tland areas.
Fauna	Refer to Table 13: Fauna PEMR	Not Applicat	ole.
	 Specification 204 Environmental Management Construction Environmental Management Plan Contract Tender Documents available at <u>https://www.mainroads.wa.gov.au/technical-</u> <u>commercial/tender-preparation/</u> 		
Machinery and	Refer to Table 14: Machinery and Vehicle	Not Applicat	ole.
Vehicle	Management PEMR		
Management	 Specification 204 Environmental Management Construction Environmental Management Plan Contract Tender Documents available at <u>https://www.mainroads.wa.gov.au/technical-</u> <u>commercial/tender-preparation/</u> 		
Mulch and Topsoil	Refer to Table 15: Mulch and Topsoil Management	Not Applicat	ole.
Management	 Specification 204 Environmental Management Construction Environmental Management Plan Specification 301 Vegetation Clearing 		

VMP Requirement	t Standard Management Action	Specific Management Action
Pegging and Flagging	 Specification 304 Revegetation and Landscaping Contract Tender Documents available at <u>https://www.mainroads.wa.gov.au/technical-</u> <u>commercial/tender-preparation/</u> Refer to Table 16: Pegging and Flagging PEMR Specification 204 Environmental Management Construction Environmental Management Plan 	Not Applicable.
	 Specification 301 Vegetation Clearing and Demolition Contract Tender Documents available at <u>https://www.mainroads.wa.gov.au/technical-</u> <u>commercial/tender-preparation/</u> 	
Water Drainage Management	 Refer to Table 17: Water Drainage PEMR Specification 204 Environmental Management Construction Environmental Management Plan 	Not Applicable.
Weed Management	 Refer to Table 18: Weed Management PEMR Specification 204 Environmental Management Construction Environmental Management Plan Contract Tender Documents available at <u>https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/</u> 	Not Applicable.
Aboriginal Heritage	 Refer to Table 19: Aboriginal Heritage PEMR Specification 204 Environmental Management Construction Environmental Management Plan Contract Tender Documents available at <u>https://www.mainroads.wa.gov.au/technical-</u> <u>commercial/tender-preparation/</u> 	Comply with conditions of Section 18 consent. No-go zones to be pegged on site. Aboriginal monitors to be engaged to monitor ground disturbing works.
Monitoring	 Specification 204 Environmental Management Construction Environmental Management Plan Superintendent's Contract Management Plan & Environmental Measurement and Evaluation Checklist. Contract Tender Documents available at <u>https://www.mainroads.wa.gov.au/technical- commercial/tender-preparation/</u> 	
Auditing	Specification 204 Environmental Management	

VMP Requirement	Standard Management Action	Specific Action	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/		

Principal Environmental Management Requirements (PEMR's)

Table 10: 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 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 11: Dieback PEMR

STANDARD MANAGEMENT ACTIONS

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 proposal 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 12: 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.
 - 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 13: 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 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 proposal 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 proposal 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 14: 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 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 15: 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 weedinfested 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

Table 16: 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 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 proposal works are completed.

Table 17: Water Drainage

PRE WORKS

 Use pollution control and containment strategies for proposal 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 proposal 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 18: Weed Management

PRE WORKS

- 1. The Contractor must remove or kill any weeds growing in proposal 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

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

Table 19: Aboriginal Heritage

PRE WORKS

- 1. Develop Operational Controls for Aboriginal Heritage Requirements.
- 2. Include Aboriginal Heritage Requirements into Communication Tools

DURING WORKS

- 1. In the event that human skeletal material is uncovered, the Contractor must cease all work at that location and report the incident to Police.
- 2. The Contractor must cease all work within 50 metres of the material and must not recommence works in this area until the Superintendent gives approval to proceed.

3. The Contractor must immediately notify the Superintendent and the Department of Planning Lands and Heritage (DPLH) of the incident.

POST WORKS

1. The Contractor must remove and dispose appropriately any demarcation, including bunting, flagging and/or fencing, once project works are completed.