



# **CLEARING IMPACT ASSESSMENT AND MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE**

## **Bowellling Curves**

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## CONTENTS

<b>SUMMARY .....</b>	<b>4</b>
<b>1. ASSESSMENT SCOPE.....</b>	<b>6</b>
<b>2. PROJECT DESCRIPTION.....</b>	<b>6</b>
2.1 PROJECT LOCATION .....	6
<b>3. METHODOLOGY .....</b>	<b>8</b>
<b>4. SOCIAL AND ECONOMIC COSTS AND BENEFITS.....</b>	<b>8</b>
<b>5. CLEARING OF NATIVE VEGETATION .....</b>	<b>8</b>
5.1 MEASURES TO AVOIDANCE AND MINIMISE CLEARING: .....	9
5.2 EXISTING VEGETATION DETAILS .....	9
5.3 ASSESSMENT AGAINST THE 10 CLEARING PRINCIPLES.....	11
<b>6. COMMONWEALTH ASPECTS AND IMPACTS.....</b>	<b>18</b>
<b>7. SUMMARY OF BIOLOGICAL SURVEYS .....</b>	<b>21</b>
<b>8. ADDITIONAL PRE CLEARING ACTIONS REQUIRED.....</b>	<b>22</b>
<b>9. STATEMENT ADDRESSING STAKEHOLDER SUBMISSIONS.....</b>	<b>22</b>
<b>10. VEGETATION MANAGEMENT .....</b>	<b>22</b>
<b>11. REFERENCES.....</b>	<b>23</b>
<b>APPENDIX A BIOLOGICAL SURVEY .....</b>	<b>25</b>
<b>APPENDIX B DIEBACK ASSESSMENT.....</b>	<b>26</b>
<b>APPENDIX C DOW CULVERT DISCHARGE TREATMENT REQUIREMENTS .....</b>	<b>27</b>
<b>APPENDIX D BED AND BANKS PERMIT .....</b>	<b>30</b>
<b>APPENDIX E HYGIENE MANAGEMENT PLAN .....</b>	<b>31</b>
<b>APPENDIX F ENVIRONMENTAL MANAGEMENT PLAN .....</b>	<b>33</b>

## SUMMARY

### PROJECT INFORMATION

**Project Title:** Bowelling Curves Realignment – Collie Lake King Road SLK 64.76 to SLK 69.85

**Project location(s):** The project is located in the townsite of Bowelling, and extends 4.5 km west of the town. The project is located in the Shire of West Arthur.

**Area proposed to be cleared:** The project is 27.43 ha in size, of which up to 17.06 ha of native vegetation will be removed.

**Project purpose / components:** The project will involve the realignment of Collie Lake King Road from SLK 64.76 to SLK 69.84 to remove dangerous curves. A number of options were considered and this was chosen as the alignment with the least impact. The project will deviate from Collie Lake King Road through farmland, connecting onto the existing cleared area that is currently the Darkan to Collie Rail Trail and then cut through Muja State Forest to re-join Collie Lake King Road.

The realignment will include two intersection modifications, a roadside stopping area and the re-establishment of the Darkan to Collie Rail Trail adjacent to the new section of road.

**Temporary clearing required:** No.

A detailed impact assessment of the project clearing activities was undertaken. This report outlines the key activities associated with the road project, the existing environment and an assessment of native vegetation clearing. This assessment provides an evaluation of the vegetation clearing impacts associated with the project using the Ten Clearing Principles and strategies used to manage vegetation clearing. It also addresses Matters of National Environmental Significance. Key items associated with the clearing assessment are listed below.

### KEY CLEARING IMPACT ASSESSMENT ASPECTS

- Up to 17.06 ha clearing of native vegetation.
- The majority of the native vegetation in the project area is in Excellent (Keighery 1994) condition (EcoEdge in 2014).
- A search of ArcGIS shapefiles and consultation with the DoW has confirmed that the proposed works will impact the Collie River, a watercourse in Collie River Irrigation District and Proclaimed under the *Rights in Water and Irrigation Act 1914*. A permit to disturb the bed and banks of the Collie River has been obtained for the works.
- The project is within the Wellington Dam Catchment Area declared under the *Country Areas Water Supply Act 1947* and will require a revegetation offset for clearing.
- The biological survey undertaken by EcoEdge in 2014 identified *Melaleuca viminea* Shrubland, occurring on clay soil in the broad shallow valley fringing the Collie River. Discussions with Department of Parks and Wildlife (DPaW) identified that this community may be analogous to the Federally Listed Threatened Ecological Community (TEC) “Clay pans with shrubs over herbs”, also listed as a Priority Ecological Community (PEC) in WA. Further survey has identified flora in the location is representative of this TEC, which typically occurs on the Darling Plateau. A total of 0.355 ha of TEC will be removed for this project.
- One-leaf Cape Tulip (*Moraea flaccida*) was identified in the project area and is a Declared Pest.
- Two Priority flora were found; *Leucopogon subsejunctus* (Priority 2) and *Synaphea hians* (Priority 3). No State or Federally-listed Threatened flora, or other species of conservation significant flora were found within the project area.

- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) were both identified in the project area.
- No more than 17.06 ha of foraging habitat for Black Cockatoos will be cleared.
- Up to 280 potential cockatoo breeding trees will be removed as a result of the project, 203 without hollows and no more than 77 with hollows of varying sizes. Of these, only 2 have hollows suitable for current use as identified in the 2016 spring survey.
- Several individuals of the listed migratory species, Rainbow Bee-eater were also observed foraging onsite.

## **KEY VEGETATION MANAGEMENT ACTIONS**

Project specific environmental management actions have been developed to manage all clearing impacts and these are outlined in the Environmental Management Plan (EMP) provided in Appendix F.

## **1. ASSESSMENT SCOPE**

This environmental impact assessment involved a desktop analysis of environmental aspects and impacts, a biological survey, and an assessment of both native vegetation clearing impacts and matters of National Environmental Significance. The desktop study area is 10 km radius. This assessment determined the need to develop and obtain approvals under the bilateral agreement.

## **2. PROJECT DESCRIPTION**

The project will involve the realignment of Collie Lake King Road from SLK 64.76 to SLK 69.84 to remove dangerous curves. A number of options were considered and this alignment was chosen as the option with the least impact. The project will deviate from Collie Lake King Road through farmland, connecting onto the existing disturbed area that is currently the Darkan to Collie Rail Trail and then cut through Muja State Forest to re-join Collie Lake King Road.

The realignment will include two intersection modifications, a roadside stopping area and the re-establishment of the Darkan to Collie Rail Trail adjacent to the new section of road.

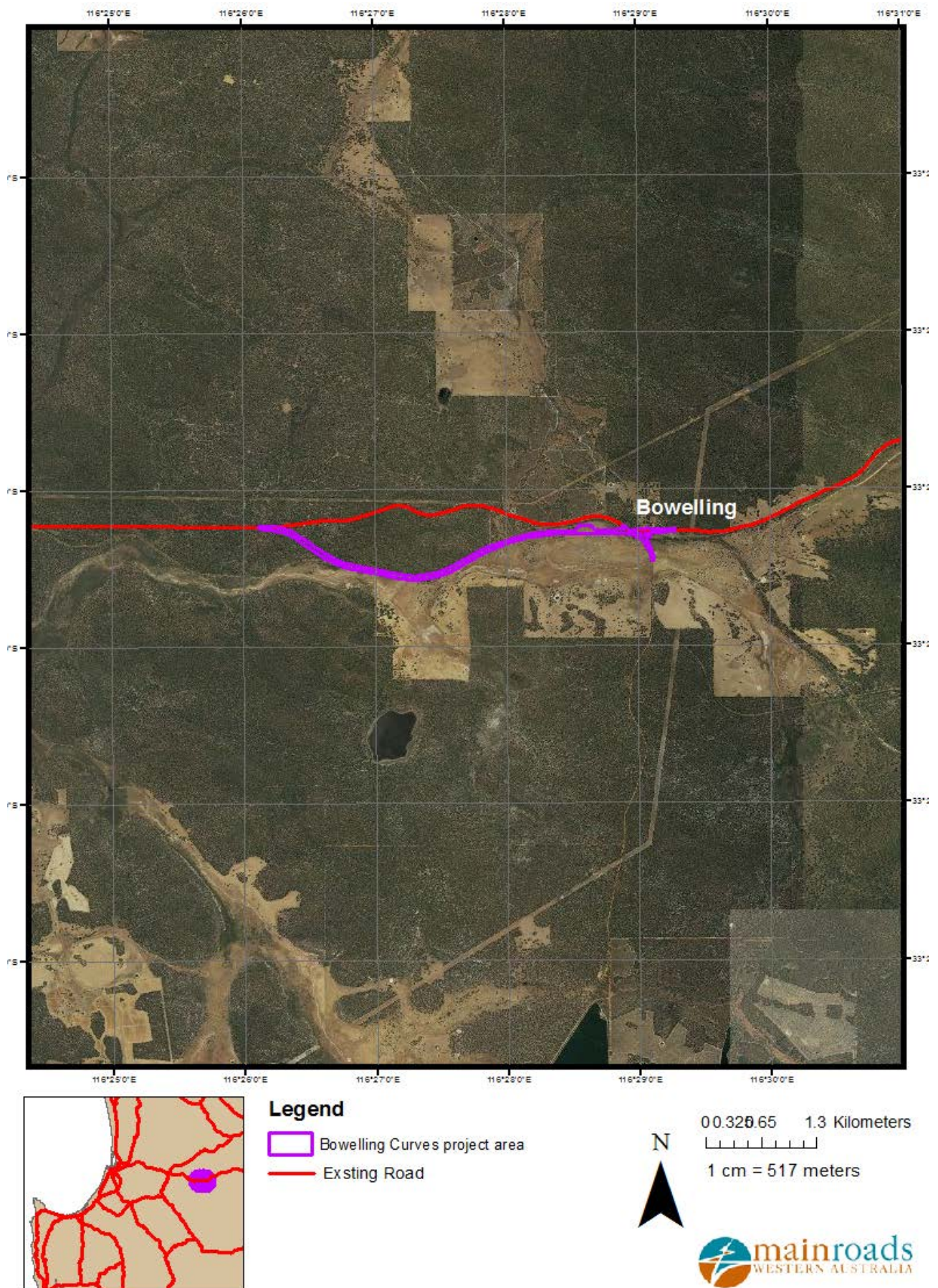
### **2.1 Project Location**

The project area is located on Collie Lake King Road from SLK 64.76 to SLK 69.84 in the Shire of West Arthur.

SLK 64.76 - 447492°49'55.4642"E 6301942°6'12.2148"N

SLK 69.84 - 452401°22'17.1173"E 6301918°9'23.8651"N

The project area is shown in Figure 1.



**Figure 1 – Project Area**



### 3. METHODOLOGY

Environmental assessment of the impacts of native vegetation clearing was undertaken and this report completed. This report includes a desktop assessment utilising relevant government databases, as well as the biological survey results. The site was surveyed in Spring 2014 by Ecoedge as part of the options analysis for the project. Two alignments were assessed as part of this survey.

Additional areas were surveyed due to design changes in Spring 2016 (EcoEdge 2016). The 2016 survey was also designed to complement and update the 2014 survey, and provide certainty regarding the classification of the *Melaleuca viminea* shrubland as a Threatened Ecological Community (TEC).

The flora and vegetation survey was carried out by Russell Smith (B.Sc. (Hons), MPhil. – Botanist) during visits to the site on 2, 5 and 28 September and 8 November 2016. The fauna survey was carried out by Greg Harewood (B.Sc. - Zoology) over a period of six days (29 September, 6 October, 6, 7 and 9 November 2014 and 16 November 2016).

A dieback assessment was completed by DPaW in 2015.

A summary of the outcome of the biological survey is provided in Section 5. Copies of the surveys undertaken are included in the appendices.

### 4. SOCIAL AND ECONOMIC COSTS AND BENEFITS

The need to upgrade the Collie Lake-King Rd has arisen because of a significant increase in freight traffic along this route; one of the main contributors being the Bunge Agribusiness Pty Ltd (Bunge). The Bunge project will construct grain handling and export facilities at the Bunbury Port and immediately west of Arthur River. Bunge will source grain directly from farmers, initially from the Narrogin-Corrigin-Lake Grace region, and will use road transport exclusively to transport grain from farms directly to the port in Bunbury, or to its holding facility in Arthur River (currently under construction).

Additionally, this section of road consists of a series of substandard horizontal curves with steep vertical longitudinal gradients and poor sight lines. Crash statistics for the last 5 years indicate that there have been 5 major accidents on this section of road; one resulting in a fatality, one major accident and three requiring medical intervention. It is expected that these statistics may become worse, as more trucks are on the road moving between Arthur River and Bunbury Port. Therefore this project is to provide significant safety improvements.

The social cost of the project is the removal of the historic rail trail between Collie and Darkan, which is currently used by day trekkers, horse riders and dirt bike riders. Extensive consultation has been undertaken with the Shire of West Arthur and the Collie to Darkan Rail Trail group. The rail trail is being realigned and constructed to the north of the project and will not be impacted long term. The rail trail is not on the Commonwealth, State or Municipal Heritage register.

The project will hire between 15 and 50 people, depending on the method of delivery, and is expected to cost approximately \$7.7 million.

### 5. CLEARING OF NATIVE VEGETATION

Native vegetation describes all indigenous aquatic and terrestrial vegetation (living or dead). The term does not include vegetation that was intentionally sown, planted or propagated unless it was required under a statutory condition.

Apart from activities that are exempt under the clearing regulation (Section 5 – Prescribed Clearing), all native vegetation clearing completed by Main Roads will be undertaken using a permit.



## 5.1 Measures to Avoidance and Minimise Clearing:

Main Roads has undertaken extensive investigation into minimising the impacts of this project, including workshops with both the Wellington District DPaW and community stakeholders such as the Collie to Darkan Rail Trail Group and the Shire of West Arthur.

The following changes were made to the design in order to minimise the clearing impact to the smallest footprint possible:

- Main Roads assessed a number of alignment options to identify the option with the least clearing impact, with a specific emphasis on utilising already cleared areas. Two final alignments were surveyed in 2014 and the current alignment chosen because it would require the least clearing of State Forest.
- Main Roads commissioned an Ethnographic survey with the traditional owners to identify any heritage sites and consult with Aboriginal community members regarding the project.
- Main Roads relocated a parking bay from the original location, which would require removal of an entire population of vegetation identified as a TEC. This parking bay was moved to an existing cleared location which is currently paddock. A total of 0.355 ha of the TEC will be cleared from a known 1.55 ha population (23%).
- The design was assessed to prevent clearing of the TEC entirely. This was found to be unviable due to the steep gradient of the site to the north, and the boundary of the Collie River to the south.
- The project was designed to have the smallest possible impact to habitat suitable for Priority 2 *Leucopogon subsejunctus*, by 'weaving' in between the two known populations. In total, 5.5 ha of suitable habitat was identified in the 2014 and 2016 spring surveys. No more than 0.73 ha (13%) will be cleared.
- The project avoids Priority 3 *Synaphea hians* known locations, with only 1 *S. hians* plant to be removed. A 0.13 ha population of *Synaphea hians* has been avoided.
- Consultation has been undertaken with Department of Water (DoW) and the design modified to prevent impacts to the Collie River in accordance with *Water Quality Protection Note 44 Roads near sensitive water resources*.
- Consultation has been undertaken with DPaW, and the design modified to prevent spread of dieback, including changes to road drainage.

## 5.2 Existing Vegetation Details

### 5.2.1 Project site vegetation description

Seven native vegetation units were recognised and mapped in the 2014 and 2016 spring surveys. The seven vegetation units are described in Table 1, including hectares of clearing for the project.

**Table 1 – Vegetation Unit**

Vegetation Unit	Vegetation Description (EcoEdge 2016)	Hectares of clearing
A1	<b>Open forest of Jarrah, (Marri), (Wandoo)</b> over shrubland/low shrubland of <i>Acacia pulchella</i> , <i>Banksia dallanneyi</i> , <i>Bossiaea ornata</i> , <i>Chamaescilla corymbosa</i> , <i>Leucopogon capitellatus</i> , <i>Trymalium ledifolium</i> , ( <i>Xanthorrhoea preissii</i> ) over open herbland of <i>Craspedia variabilis</i> , <i>Desmocladius fasciculatus</i> , <i>Drosera erythrorhiza</i> , <i>Lagenophora huegelii</i> , <i>Loxocarya cinerea</i> , <i>Stylidium affine</i> and <i>Trichocline spathulata</i> .	1.739
A2	<b>Open forest of Jarrah, Marri, (Wandoo)</b> over shrubland/low shrubland of <i>Acacia pulchella</i> , <i>Hakea lissocarpa</i> , ( <i>Grevillea bipinnatifida</i> ), <i>Hibbertia commutata</i> , ( <i>Leucopogon subsejunctus</i> ), ( <i>Trymalium ledifolium</i> ) over open herbland/grassland of <i>Drosera erythrorhiza</i> , <i>Hyalosperma cotula</i> , <i>Lagenophora huegelii</i> , <i>Loxocarya cinerea</i> , <i>Millotia tenuifolia</i> , <i>Neurachne alopecuroidea</i> , <i>Stylidium affine</i> , <i>S. piliferum</i> and <i>Trichocline spathulata</i> .	4.49
B1	<b>Woodland of Wandoo or Marri</b> over open low shrubland of <i>Acacia pulchella</i> , <i>Grevillea bipinnatifida</i> , <i>Hakea varia</i> , <i>Hypocalymma angustifolium</i> over open herbland/grassland of <i>*Briza maxima</i> , <i>Neurachne alopecuroidea</i> , <i>*Lysimachia arvensis</i> , <i>Hypolaena exsulca</i> , <i>Sowerbaea laxiflora</i> and <i>Stylidium crassifolium</i> .	0.904
B2	<b>Tall Open Shrubland</b> of <i>Melaleuca viminea</i> , <i>Hakea prostrata</i> , <i>Kunzea ciliata</i> and <i>Verticordia pennigera</i> over a diverse herbland including <i>Drosera gigantea</i> , <i>D. glanduligera</i> , <i>Chamaescilla corymbosa</i> , <i>Stylidium crassifolium</i> and open sedgeland of <i>Apodasmia ceramophila</i> .	0.355
C1	<b>Low woodland/ tall shrubland</b> of <i>Hakea prostrata</i> - <i>H. varia</i> - <i>M. viminea</i> tall shrubland (sometimes with <i>M. cuticularis</i> as shown in the photograph), <i>Kunzea ciliata</i> and <i>Verticordia pennigera</i> or tall shrubland of <i>Hakea trifurcata</i> , <i>H. varia</i> and <i>Pericalymma ellipticum</i> .	4
C2	<b>Open forest of Jarrah, Wandoo</b> over shrubland/low shrubland of <i>Allocasuarina humilis</i> , <i>Banksia squarrosa</i> , <i>Hakea lissocarpa</i> , <i>H. prostrata</i> , <i>H. trifurcata</i> , <i>Kunzea recurva</i> , <i>Petrophile serruriae</i> and <i>Xanthorrhoea preissii</i> .	4.329
E	<b>Woodland</b> of Marri, Wandoo, <i>Melaleuca cuticularis</i> (occasional) over pasture species.	1.23
<b>Total</b>		<b>17.06 ha</b>

As described in Appendix A, vegetation types D and F are not considered native vegetation, comprising of cleared and pasture areas, and a small area of native grasses that appear to have been planted.

**Table 2 – Vegetation Condition**

Native Vegetation Condition	Hectares of clearing
Completely Degraded	2.34
Degraded	1.18
Good	0.36
Very Good	0.296
Very Good/Excellent	4.29
Excellent	8.59
<b>Total</b>	<b>17.06</b>

For a full description of the existing vegetation, refer to the Biological Assessment in Appendix A.

## 5.2.2 Vegetation complexes (Hedde/Mattiske) and representation (Beard)

**Table 3: Vegetation Representation**

Project Area	Pre-European Extent (ha)	Current Extent (ha)	% Remaining	% Remaining in DPaw reserves
IBRA Region Jarrah Forest	4,506,660.26	2,422,782.95	53.76	69.01
Statewide Beard Veg Assoc No. 3	2,661,088.27	1,810,473.21	68.04	81.09
In IBRA region Beard Veg Assoc No. 3 Jarrah Forest region	2,390,591.42	1,611,061.04	67.39	80.56
Local Government Authority Shire of West Arthur	98,993.74	50,926.72	51.44	50.68
Statewide Beard Veg Assoc No. 1114	19,836.15	12,083.66	60.92	78.88
In IBRA region Beard Veg Assoc No. 1114 Jarrah Forest region	19,836.15	12,083.66	60.92	78.88
Local Government Authority Shire of West Arthur	8,735.02	3,325.46	38.07	48.00

**Table 4: Vegetation complexes (Havel/Mattiske) within the Project Area**

Havel/Mattiske Veg Complex	Pre-European Extent (ha)	2013 Veg extent	% remaining
Swamp - Mosaic of low open woodland of <i>Melaleuca preissiana</i> - <i>Banksia littoralis</i> , closed scrub of Myrtaceae spp., closed heath of Myrtaceae spp. and sedgelands of <i>Baumea</i> and <i>Leptocarpus</i> spp. on seasonally wet or moist sand, peat and clay soils on valley floors in all climatic zones.	53,658.24	40,731.69	75.91
Pindalup - Open forest of <i>Eucalyptus marginata</i> subsp. <i>thalassica</i> - <i>Corymbia calophylla</i> on slopes and open woodland of <i>Eucalyptus wandoo</i> with some <i>Eucalyptus patens</i> on the lower slopes in semiarid and arid zones.	167,148.85	128,674.47	76.98

## 5.3 Assessment Against the 10 Clearing Principles

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

The project may be at variance with one or more of the 10 clearing principles.

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

Comments	Proposed clearing is at variance to this Principle
	<p>Seven native vegetation units were recognised and mapped in the 2016 spring survey. The majority of the native vegetation in the project area was in Excellent (Keighery 1994) condition. The spring survey identified that the native vegetation in the project area has a high level of biodiversity.</p> <p>Two hundred and seventy-eight vascular flora taxa were identified within the 2016 survey, of which 32 were introduced species.</p> <p><i>Leucopogon subsejunctus</i> (Priority 2) was identified in the project area and its extent of supporting habitat mapped. Based on this mapping, 0.73 ha (13%) of habitat suitable for this species will be impacted, of the 5.5 ha identified in the immediate area. DPaW records indicate 10 known populations spread over a geographical area of 37,000 ha but the data available for population counts is incomplete. Population descriptions ranged from “locally abundant” to “rare”. There are 29 NatureMap (DPaW, 2016) records for this species. The population within the Bowelling survey area appears to form the most northerly part of the species’ currently known distribution. The clearing at this location is not considered significant however, as the majority of the population will remain.</p> <p>One individual <i>Synaphea hians</i> plant (Priority 3) was identified in the project area and will be removed for the project. <i>Synaphea hians</i> has a much wider distribution, ranging from near Bowelling west to the Cowaramup area. It is represented by 67 records in NatureMap. During the 2014 survey, approximately 20 plants of <i>S. hians</i> (0.13 ha) were located under the power line about 180 m east of the present project. This population will not be impacted.</p> <p>Vegetation Unit C1 (<i>Hakea prostrata</i>-<i>H. varia</i>- <i>M. viminea</i> tall shrubland) is situated on alluvial soil adjacent to the Collie River. Some parts of this vegetation unit have the small tree <i>Melaleuca cuticularis</i> as a component. Areas where <i>M. cuticularis</i> is present are regarded by DPaW as of relatively high conservation value. It is not expected that any areas of this community with <i>M. cuticularis</i> present will be removed for the project.</p> <p>Vegetation unit B2 (<i>Melaleuca viminea</i>-<i>Hakea prostrata</i>-<i>Kunzea ciliata</i> tall open shrubland), which is rich in herbaceous species, is associated with the broad, shallow valley of the Collie River East, much of which has been cleared for agriculture. Initially vegetation unit B2 was identified as a restricted “floristic community type”. Further consultation with DPaW and additional survey in 2016 has identified this vegetation unit as potentially an occurrence of the Federally-listed TEC “Claypans of the Swan Coastal Plain”, which is Critically Endangered. This TEC comprises four separate State-listed TECs and one PEC. Of these, the project vegetation would most likely be an occurrence of the “Clay pans with shrubs over herbs” PEC, which is included within the Federally-listed TEC and which typically occurs on the Darling Plateau (DPaW, 2015). Surveys of two parcels in the surrounding region were undertaken in Spring 2015, as part of works to identify a suitable offset for this project. This vegetation type (totalling 1 ha) was also identified in both offset areas surveyed, and therefore it is considered likely that this community occurs in other parts of the surrounding local area and potentially regionally although it is acknowledged it is restricted and of elevated conservation value.</p> <p>Fifty-three native fauna species were observed in the fauna survey undertaken by Greg Harewood (Ecoedge 2016). Evidence of two listed threatened species was observed:</p> <ul style="list-style-type: none"> <li>• Carnaby’s Black Cockatoo (<i>Calyptorhynchus latirostris</i>) - chewed marri and jarrah fruits</li> <li>• Forest Red-tailed Black Cockatoo (<i>Calyptorhynchus banksii naso</i>) - individuals and chewed marri and jarrah fruits.</li> </ul> <p>Several individuals of the Migratory Rainbow Bee-eater (<i>Merops ornatus</i>) were also observed foraging on site. No evidence of any DPaW priority species using the area was found.</p> <p>Based on the habitats present and current documented distributions, it is considered possible</p>

	that 10 additional species may use the project area for some purpose at times, although as no evidence of presence or use was found at the time of the field survey. Habitat for some of these species on-site, while considered possibly suitable, may be marginal in extent/quality and the species listed may only be present within the survey area in low numbers and/or for short periods.
	The proposed clearing is considered to be at variance to this principle.
<b>Methodology</b>	Ecoedge 2016 DPAW shapefiles MRWA GIS Shapefiles

**(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 may be at variance to this Principle
	<p>Fifty-three native fauna species were observed in the fauna survey undertaken by Greg Harewood (Ecoedge 2016). Evidence of two listed threatened species was observed:</p> <ul style="list-style-type: none"> <li>• Carnaby's Black Cockatoo (<i>Calyptrorhynchus latirostris</i>) - chewed marri and jarrah fruits</li> <li>• Forest Red-tailed Black Cockatoo (<i>Calyptrorhynchus banksii naso</i>) - individuals and chewed marri and jarrah fruits.</li> </ul> <p>Several individuals of the Migratory Rainbow Bee-eater (<i>Merops ornatus</i>) were also observed foraging on site.</p> <p>No evidence of any Priority species using the area was found.</p> <p>Based on the habitats present and current documented distributions, it is considered possible that 10 additional species may use the project area for some purpose at times, although no evidence of these species was found in the spring survey. Habitat for some of these species on-site, while considered possibly suitable, may only be used for short durations or when in transit (Ecoedge 2016):</p> <ul style="list-style-type: none"> <li>• Great Egret (<i>Ardea alba</i>) – S5 (WC Act), Migratory (EPBC Act) - Potentially utilises watercourses, wetlands, drains and paddocks though the quality of most of these habitats are marginal due to historical disturbance such as native vegetation clearing. Would not breed within the project area.</li> <li>• Cattle Egret (<i>Ardea ibis</i>) – S5 (WC Act), Migratory (EPBC Act) - Potentially utilises watercourses, wetlands, drains and paddocks though the quality of most of these habitats are marginal due to historical disturbance such as native vegetation clearing. Would not breed within the project area.</li> <li>• Peregrine Falcon (<i>Falco peregrinus</i>) – S7 (WC Act) - Uncommon so unlikely to be resident in area but may form part of larger home range. No potential nest sites observed.</li> <li>• Baudin's Black-Cockatoo (<i>Calyptrorhynchus baudinii</i>) – S2 (WC Act), Vulnerable (EPBC Act) – The project is within the documented distribution of this species and while not observed it may occur on occasions.</li> <li>• Masked Owl (<i>Tyto novaehollandiae</i>) – P3 (DPaW Priority Species) - Status on the site and in the general area difficult to determine. May occur on rare occasions.</li> <li>• Southern Brush-tailed Phascogale (<i>Phascogale tapoatafa</i> ssp) – S3 (WC Act) - This species is known to persist in state forest and national park areas surrounding Collie and therefore it may frequent the study site.</li> <li>• Chuditch (<i>Dasyurus geoffroyi</i>) – S3 (WC Act), Vulnerable (EPBC Act) - Actual status on the site is difficult to determine. This species is however known to frequent the general area and therefore may utilise sections of the area at times.</li> <li>• Quenda (<i>Isodon obesulus fusciventer</i>) – P4 (DPaW Priority Species) - Most of the project appears unsuitable for this species due to a lack of dense groundcover but it may persist at locations where native vegetation provides sufficient cover.</li> <li>• Western Brush Wallaby (<i>Macropus irma</i>) – P4 (DPaW Priority Species) - This species is known to frequent forest areas around Collie in low densities.</li> <li>• Western False Pipistrelle (<i>Falsistrellus mackenziei</i>) - P4 (DPaW Priority Species) -The</li> </ul>

	<p>current status of this species in general area is difficult to determine but may be utilising woodland areas as roosting and foraging habitat.</p> <p>Numbat are known to be locally extinct.</p> <p>The extent of habitat suitable for these species extends well outside the study area and these fauna habitats are well represented in adjoining state forest areas. No evidence was gathered that suggest habitats within the project area are in a significantly better condition than those found in adjoining areas.</p> <p>A single priority invertebrate species appeared in the DPaW database search (DPaW 2016b), <i>Pachysaga munggai</i>, an unnamed cricket species classified as Priority 3. The status of this species within the area is difficult to determine however most the project area appears unsuitable as heathland and leaf litter are typically absent or sparse.</p> <p>Almost all areas of remnant native vegetation present within the study area can be considered to represent potential black cockatoo foraging habitat. A total of 17.06 ha of foraging habitat is present in the project area, assuming that <i>Amphibromus nervosus</i> tall grassland (Vegetation Type D) and cleared pasture (Vegetation Type F) provide only limited foraging potential. No roosting trees were identified. Up to 280 potential Black cockatoo breeding trees may be cleared, of which no more than 77 will have hollows. Two of these trees have multiple hollows suitable for current use. One is a Marri with three hollows suitable for current use; the second is a wandoo with more than five hollows, one of which was considered suitable for current use. No evidence of use (occupancy or chew marks) was found.</p> <p>Impacts of the project to Black Cockatoo species are unlikely to be significant, as there is an abundance of similar and better condition vegetation in the surrounding State Forest. A total of 32,384 ha of suitable vegetation is available within 10 km of the project.</p> <p>The proposed clearing may be at variance to this principle.</p>
<b>Methodology</b>	<p>DPaW Shapefiles</p> <p>Naturemap</p> <p>Ecoedge 2016</p>

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

<b>Comments</b>	<b>Proposed clearing is not likely to be at variance to this Principle</b>
	<p>Five Threatened flora are known to occur within 10 km of the project (Table 5 of Appendix A). Two of these, <i>Caladenia leucochila</i> and <i>Diuris micrantha</i> were considered to have a moderate likelihood of occurrence. The project was surveyed in Spring 2014 and Spring 2016 and targeted to the flowering periods of both rare and priority flora (September). No Declared Rare Flora was identified in either survey and none have been recorded in the immediate vicinity previously, based on DPaW records. The proposed clearing is not likely to be at variance to this principle.</p>
<b>Methodology</b>	<p>DPaW shapefiles</p> <p>Ecoedge 2016</p>

**(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.**

<b>Comments</b>	<b>Proposed clearing is at variance to this Principle</b>
	<p>Vegetation unit B2 (<i>Melaleuca viminea-Hakea prostrata-Kunzea ciliata</i> tall open shrubland), which is rich in herbaceous species, is associated with the broad, shallow valley of the Collie River East, much of which has been cleared for agriculture. Initially vegetation unit B2 was identified as a restricted "floristic community type". Further consultation with DPaW and additional survey in 2016 has identified this vegetation unit as potentially an occurrence of the</p>

	<p>Federally-listed TEC "Claypans of the Swan Coastal Plain", which is Critically Endangered. This TEC comprises four separate State-listed TECs and one PEC. Of these, the project vegetation would most likely be an occurrence of the "Clay pans with shrubs over herbs" PEC, which is included within the Federally-listed TEC and which typically occurs on the Darling Plateau (DPAW, 2015).</p> <p>Surveys of two parcels in the surrounding region were undertaken in Spring 2015, as part of works to identify a suitable offset for this project. This vegetation type (totalling 1 ha) was also identified in both offset areas surveyed, and therefore it is considered likely that this community occurs in other parts of the surrounding local area and potentially regionally although it is acknowledged it is restricted and of elevated conservation value.</p> <p>The proposed clearing is considered to be at variance to this principle.</p>
<b>Methodology</b>	<p>DPAW shapefiles</p> <p>Ecoedge 2016</p>

**(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.**

<b>Comments</b>	<b>Proposed clearing is not likely to be at variance to this Principle</b>
	<p>The project occurs in pre-European Vegetation Association 3, described as 'Medium forest: jarrah-marri', and Vegetation Association 1114, described as 'Shrublands tree-heath; paperbark over teatree thickets' (Government of Western Australia, 2016). The project area is also mapped in two vegetation complexes, Swamp (S) and a very small area of Pindalup (Pn) vegetation complex. These vegetation complexes are described in Table 4, Section 5.2.2.</p> <p>In 2001, the Commonwealth of Australia stated National Targets and Objectives for Biodiversity Conservation, which recognised that the retention of 30%, or more, of the pre-clearing extent of each ecological community was necessary if Australia's biological diversity was to be protected (Environment Australia, 2001). This level of recognition is in keeping with the targets set in the EPA's Position Statement on the 'Environmental protection of native vegetation in Western Australia: clearing of native vegetation, with particular reference to the agricultural area' (EPA, 2000). With regard to conservation status, the EPA has set a target of 15% of pre-European extent for each ecological community to be protected (EPA, 2006). Both vegetation complexes meet this target, with 75.91% of Swamp remaining and 76.98% of Pindalup (DEC 2007). The vegetation representation (Table 3) has identified more than 40% remaining of the Pre-European Vegetation Associations in the Shire, and more than 78% in the state.</p> <p>The local area and Shire have a high retention of remnant vegetation of similar or better quality and the proposed clearing area does not function as a significant corridor as it is contiguous with surrounding forested areas.</p> <p>The proposed clearing is not likely to be at variance to this Principle.</p>
<b>Methodology</b>	<p>Ecoedge 2016</p> <p>Government of Western Australia (2015)</p> <p>Environment Australia, 2001</p> <p>EPA, 2000</p> <p>EPA, 2006</p> <p>Government of Western Australia, 2016</p> <p>Havel/Mattiske</p>

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

<b>Comments</b>	<b>Proposed clearing is at variance to this Principle</b>
	<p>A search of ArcGIS shapefiles and consultation with the DoW has confirmed that the proposed works will impact the East Branch of the Collie River, a watercourse in Collie River Irrigation District and Proclaimed under the <i>Rights in Water and Irrigation Act 1914</i>. A permit to disturb</p>



	<p>the bed and banks of the Collie River has been obtained from DoW (Appendix D). The Collie River is already cleared by sheep grazing at this location and therefore no clearing is proposed.</p> <p>Ecoedge identified wetland vegetation in units B2, C1 and C2. Up to 8.69 ha of these three vegetation units will be cleared for the project.</p> <p>The project is within the Wellington Dam Catchment Area declared under the <i>Country Areas Water Supply Act 1947</i> and will require a revegetation offset for clearing.</p> <p>The proposed clearing is at variance to this principle.</p>
<b>Methodology</b>	DoW shapefiles Ecoedge 2016

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

<b>Comments</b>	<b>Proposed clearing is not likely to be at variance to this Principle</b>	
	<b>Degradation hazard</b>	<b>Risk</b>
	Flood	>70% adjacent to collie river, 0-30% elsewhere
	Salinity	30-70<%
	Sub-soil acidification	0-30%
	Waterlogging	>70% adjacent to collie river, 0-30% elsewhere
	Water erosion	10-30%
	Water repellence	10-30%
	Wind erosion	10-30%
	(NRM SLIP 2016)	
	<p>The project is in an area with high flood risk adjacent to the Collie River, and a moderate risk of salinity which is known to cause land degradation. All other degradation risks are considered low. Given the majority of the vegetation in the surrounding region is State Forest, and over 78% remains of Pre-European vegetation in the region, the risk of the project causing appreciable degradation is low. The proposed clearing is not likely to be at variance to this principle.</p>	
<b>Methodology</b>	Natural Resource Management SLIP Soil Systems	

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

<b>Comments</b>	<b>Proposed clearing is at variance to this Principle</b>	
	<p>The proposed clearing area is located in State Forest. Discussions have been held with the local DPaW office since project inception to ensure that project clearing activities are undertaken in accordance with requirements, and will have the least possible impact on surrounding State Forest. The section of state forest that will be directly impacted is in the process of being excised, and tenure will be changed to road reserve.</p>	
	<p>The proposed clearing is at variance to this principle.</p>	
<b>Methodology</b>	DPAW shapefiles	

**(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
	<p>A geotechnical investigation (Aurecon 2016) was undertaken in 2015 which identified the project within the Upper Collie Catchment Area. The East Branch of the Collie River has ephemeral qualities with very little to no flow during the dry season. Other small creeks and gullies in the area are also likely to be ephemeral. Consultation with the DoW has been undertaken to ensure the design is in accordance with <i>Water Quality Protection Note 44 Roads near sensitive water resources</i>. It is not expected that the project will significantly impact the quality of surface water.</p> <p>Groundwater in the project area is expected to typically occur below the impermeable granitic basement rocks, with an unconfined aquifer overlying the basement rocks. No groundwater was encountered in the geotechnical investigation which was undertaken in summer. It is likely that during the wet season there is a localised perched groundwater level in the Collie River floodplain, which coincides with the low points of the topography in the area. Drainage for the project has been designed to protect the surrounding State Forest from dieback spread, and channel water into the Collie River via a treatment area to maintain water quality. Low lying areas that may contain groundwater close to the surface will be subject to fill, lifting the road level. The project is not expected to cause deterioration of groundwater quality.</p> <p>The proposed clearing is not likely to be at variance to this principle.</p>
<b>Methodology</b>	DoW shapefiles <i>Water Quality Protection Note 44 Roads near sensitive water resources</i> Aurecon 2016

**(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
	<p>A small section of the proposed clearing area is adjacent to the Collie River and within the Collie River East Branch flood plain. This area has a higher risk of flooding; the rest of the project is low risk. The project is not expected to exacerbate flooding as the road level will be higher than the flood plain after construction. Waters will be directed into the river in the low-lying area at the southern end of the project, in accordance with DoW requirements. The road project will include drainage and water sensitive design to ensure no ponding or impediment to natural water flows.</p> <p>The proposed clearing is not likely to be at variance to this principle.</p>
<b>Methodology</b>	Natural Resource Management SLIP Soil Systems DoW shapefiles

## 6. COMMONWEALTH ASPECTS AND IMPACTS

The existing environment, nature and extent of impact or potential impact to the following matters of NES were assessed with regard to the project:

**Table 3: Assessment of Existing Environment, Matters of National Environmental Significance (NES) and Likely Impact.**

Matter of NES	Existing Environment and Likely Impact
<b>Nationally listed threatened species or ecological communities</b>	<p>The Protected Matters Search Tool (PMST) was consulted for this project in 2014 and 2016, prior to the spring surveys (Appendix A).</p> <p>Thirteen Threatened species were identified as potentially occurring within 10 km of the project in the 2016 PMST search. No threatened ecological communities are known to occur within 10 km of the project; however one was identified in the spring survey.</p>
<b>Justification of likely impact</b>	<p>Evidence of two listed threatened species was observed:</p> <ul style="list-style-type: none"> <li>• Carnaby's Black Cockatoo (<i>Calyptrorhynchus latirostris</i>) - chewed marri and jarrah fruits</li> <li>• Forest Red-tailed Black Cockatoo (<i>Calyptrorhynchus banksii naso</i>) - individuals and chewed marri and jarrah fruits.</li> </ul> <p>Almost all areas of remnant native vegetation present within the study area can be considered to represent potential black cockatoo foraging habitat. A total of 17.06 ha of foraging habitat is present in the project area, assuming that <i>Amphibromus nervosus</i> tall grassland (Vegetation Type D) and paddock (Vegetation Type F) provide only limited foraging potential. No roosting trees were identified. Up to 280 potential Black Cockatoo breeding trees may be cleared, of which no more than 77 will have hollows. Two of these trees have multiple hollows suitable for current use. One is a Marri with three hollows suitable for current use; the second is a wandoo with more than five hollows, one of which was considered suitable for current use. No evidence of use (occupancy or chew marks) was found.</p> <p>Impacts of the project to Black Cockatoo species are unlikely to be significant, as there is an abundance of similar and better condition vegetation in the surrounding State Forest. A total of 32,384 ha of suitable vegetation is available within 10 km of the project.</p> <p>Based on the habitats present and current documented distributions, it is considered possible that 2 additional Vulnerable species may use the project area at times (Ecoedge 2016):</p> <ul style="list-style-type: none"> <li>• Baudin's Black-Cockatoo (<i>Calyptrorhynchus baudinii</i>) – Vulnerable (EPBC Act) – The project is within the documented distribution of this species and while not observed it may occur on occasions.</li> <li>• Chuditch (<i>Dasyurus geoffroii</i>) – Vulnerable (EPBC Act) - Actual status on the site difficult to determine. This species is however known to frequent the general area and therefore may utilise sections of the area at times.</li> </ul> <p>Numbat are known to be locally extinct.</p>

	<p>The project could present habitat for Western Ringtail Possum (<i>Pseudocheirus occidentalis</i>) and Red-tailed Phascogale (<i>Phascogale calura</i>) although these are considered unlikely. The project does not represent core habitat for Phascogale, with the majority of the project mapped as Open Forest.</p> <p>The extent of habitat suitable for these species extends well outside the project area and these fauna habitats are well represented in adjoining state forest areas. No evidence was gathered that suggest habitats within the project area are in a significantly better condition than those found in adjoining areas.</p> <p>Vegetation unit B2 is associated with the broad, shallow valley of the Collie River East Branch, much of which has been cleared for agriculture. Initially vegetation unit B2 was identified as a restricted "floristic community type". Further consultation with DPaW and additional survey in 2016 has identified this vegetation unit as potentially an occurrence of the Federally-listed TEC "Claypans of the Swan Coastal Plain", which is Critically Endangered. This TEC comprises four separate State-listed TECs and one PEC. Of these, the project vegetation would most likely be an occurrence of the "Clay pans with shrubs over herbs" PEC, which is included within the Federally-listed TEC and which typically occurs on the Darling Plateau (DPaW, 2015). A total of 0.355 ha of the TEC will be cleared from a known 1.55 ha population (23%).</p> <p>Surveys of two parcels in the surrounding region were undertaken in Spring 2015, as part of works to identify a suitable offset for this project. This vegetation type (totalling 1 ha) was also identified in both offset areas surveyed, and therefore it is considered likely that this community occurs generally in the surrounding region.</p>
<i>Methodology</i>	DotE PMST EcoEdge 2016

<b><i>Migratory species</i></b>	<p>The PMST identified two migratory birds as potentially occurring in the project area, Fork-tailed Swift (<i>Apus pacificus</i>) and Grey Wagtail (<i>Motacilla cinerea</i>).</p> <p>Rainbow Bee-eater is known to occur in the project area. Two other species, Cattle Egret and Great Egret are considered likely to occur.</p>
<b><i>Justification of likely impact</i></b>	<p>Several individuals of the Rainbow Bee-eater (<i>Merops ornatus</i>) were observed foraging on site. The Rainbow Bee-eater is a common summer migrant to southern Australia (Morcombe 2004).</p> <p>Great Egret (<i>Ardea alba</i>) and Cattle Egret (<i>Ardea ibis</i>) are considered likely to occur on an opportunistic basis. Both Egrets may potentially utilise watercourses, wetlands, drains and paddocks in the project area, though the quality of most of these habitats are marginal due to historical disturbance such as native vegetation clearing. No breeding habitat for these species was identified in the project area.</p> <p>Fork-tailed Swift are very uncommon in the south west and rarely utilise terrestrial habitats (i.e. almost entirely aerial). May occur very occasionally. Grey Wagtail is also considered unlikely to occur in the project area.</p> <p>The project is not considered to be significant habitat for migratory species, with an abundance of similar habitat in the surrounding region and no habitat essential to breeding identified for these species.</p>
<i>Methodology</i>	DotE PMST Ecoedge 2016

<b><i>Wetlands of International Importance</i></b>	No wetlands of international importance were identified in the PMST.
<b><i>Justification of likely impact</i></b>	No wetlands of international importance are likely to be impacted by the project.
<i>Methodology</i>	DotE PMST

<b>World Heritage Properties</b>	No world heritage properties were identified in the PMST.
<i>Justification of likely impact</i>	No world heritage properties are expected to be impacted.
<i>Methodology</i>	DotE PMST

<b>National Heritage Places</b>	No national heritage properties were identified in the PMST.
<i>Justification of likely impact</i>	No national heritage properties are expected to be impacted.
<i>Methodology</i>	DotE PMST

<b>Commonwealth Land or Marine Areas</b>	Project activities are not located on or near Commonwealth land or marine areas. Commonwealth land or marine areas will not be impacted by the activities associated with the project.
<i>Justification of likely impact</i>	No commonwealth land is expected to be impacted.
<i>Methodology</i>	DotE PMST

<b>Nuclear Actions</b>	Not relevant to the proposed activity.
<i>Justification of likely impact</i>	No project actions involve nuclear actions. Therefore no project impact on this matter.
<i>Methodology</i>	DotE PMST

<b>Water Resource</b>	Not relevant to the proposed activity.
<i>Justification of likely impact</i>	No project actions involve a water resource. Therefore no project impact on this matter.
<i>Methodology</i>	DotE PMST

## 7. SUMMARY OF BIOLOGICAL SURVEYS

Three biological surveys and one dieback survey have been undertaken of the project area as detailed below.

### 2014 Flora and vegetation survey – Ecoedge

This Level 1 survey was undertaken in September 2014, when two alignment options were being considered for the project. A revised and expanded survey area of the southern alignment option was assessed in late October 2014. The key findings of the survey are detailed below:

- Identification of 220 vascular plant taxa, including 20 exotic species. One of the exotic species, *Moraea flaccida* (One-leaf Cape Tulip) is listed as a C3 pest plant for the Shire of West Arthur.
- No Declared Rare Flora under the *WC Act*, or plants listed as threatened under the Commonwealth *EPBC Act* were found within the survey areas. However, two Priority Flora species, *Leucopogon subsejunctus* (P2) and *Synaphea hians* (P3) were found; both of them are presumed to be newly-discovered occurrences.
- The population of *S. hians* comprised approximately 20 plants.
- The initial survey identified a population of *Leucopogon subsejunctus* (P2) over an area of about 0.5 ha with 27% (40-60 plants) within the survey area. The second survey identified three sub-populations (including the population found during the first survey), totalling 5.5 ha and consisting of 2,500 to 3,000 individual plants.
- Six vegetation units were recognised and mapped for the two survey areas, including a unit represented mainly by areas of pasture. Most of the vegetation complexes in which these vegetation units occur are deemed to be well represented in conservation reserves and State forest. However, the herb-rich *Melaleuca viminea* shrubland unit, which is found on the flats of the Collie River East, may be a restricted floristic community type.

### 2014 Fauna survey - Harewood

This L1 survey was undertaken from September to November 2014 over 5 days, and included targeted searches for listed threatened species. Evidence of two listed threatened species was observed (Carnaby's black-cockatoo (chewed marri and jarrah fruits) and forest red-tailed black-cockatoo (individuals and chewed marri and jarrah fruits). Several individuals of the rainbow bee-eater were also observed foraging on site. No evidence of any DPaW priority species using the area was found. The assessment identified a total of 1,348 habitat trees within the fauna survey area as a whole. The majority (945, ~70.1%) of the trees were not observed to contain hollows of any size. Three hundred and seventy nine (~28.1%) of the trees contained one or more "small" hollows (less than ~12cm entrance size) considered not to be suitable for black cockatoos to use for nesting purposes. Twenty four (~1.8%) trees appeared to contain hollows with larger entrances (greater than ~12cm) that appeared big enough to possibly allow the entry of a black cockatoo into a suitably sized and orientated branch/trunk, though none showed any sign of current or previous use for this purpose. No existing roosting trees (trees used at night by black cockatoos to rest) were identified during the survey period. Eleven conservation significant species were identified as 'possible' in the likelihood of occurrence assessment.

### 2015 Dieback survey – Department of Parks and Wildlife

The project area was identified as having areas of evident dieback infestation, as well as protectable areas. Methodology to protect the surrounding region via drainage control have been developed in conjunction with the Collie DPaW office.

### 2016 Biological Survey – Ecoedge

Ecoedge was engaged by Main Roads in August 2016 to undertake a Level 2 flora and vegetation survey and Level 1 fauna survey on areas of the project that were added since the original 2014 survey. The 2016 survey was also designed to complement and update the 2014 survey, in order to meet changing regulatory requirements during that period, and provided certainty regarding the classification of the *Melaleuca viminea* shrubland as a TEC.

The flora and vegetation survey was carried out by Russell Smith (B.Sc. (Hons), MPhil. – Botanist) during visits to the site on 2, 5 and 28 September and 8 November 2016. The fauna survey was carried out by Greg Harewood (B.Sc. - Zoology) over a period of six days (29 September, 6 October, 6, 7 and 9 November 2014 and 16 November 2016).

## **8. ADDITIONAL PRE CLEARING ACTIONS REQUIRED**

A Bed and Banks permit has been obtained for the works. Surface water impacts have been designed in accordance with DoW requirements. A Hygiene Management Plan has been developed in consultation with the local DPaW office, which includes dieback control measures.

A Topsoil Management Plan and Revegetation Management Plan (for revegetation undertaken under the CAWS Act) will all be developed for the works as required. An Offset Proposal will be prepared.

## **9. STATEMENT ADDRESSING STAKEHOLDER SUBMISSIONS**

Main Roads has liaised with a number of stakeholders during the development of this project including:

- Shire of West Arthur
- Department of Parks and Wildlife
- Department of Water
- Collie to Darkan Rail Trail group
- Local farmers
- Department of Aboriginal Affairs
- Gnaala Karla Booja (via ethnographic survey).

## **10. VEGETATION MANAGEMENT**

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



## 11. REFERENCES

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Appendix A

**Biological Survey**

## Appendix B

### **Dieback Assessment**

## Appendix C

### DoW Culvert Discharge Treatment Requirements

23 June 2016

Our Reference: RF9973-02~1, PA# 8246

Your Reference: M037 Bowelling Curves Re-alignment

To: Main Roads WA

From: Department of Water

Attention: Robert Evans

#### RE: Culvert Discharge Treatment Requirements

Main Roads WA proposed to realign a 5km stretch of the Collie-Lake King Road in the vicinity of the junction with the Bowelling-Duranillin Road. Flood mapping shows the proposed road alignment to be located within the flood plain, and within areas that have a flood flow velocity of 1.0 to 1.5 m/s. This section of road is understood to include eleven culverts allow surface runoff from the northern upstream slope, toward the Collie River flood plain to the south.

There is limited downstream distance between two culverts and the east branch of the Collie River (at Chainage 67200m and 66775m), for the remaining nine culverts there is significant land between the culverts and Collie River. Advice has been sought regarding the management of culvert discharge treatment requirements, specifically for these two culverts with regard to both short term construction phase and longer term.

#### Culvert discharge treatment

For construction works the department has developed [\*Water Quality Protection Note 44 Roads near sensitive water resources \(2006\)\*](#). This note outlines road construction risks and provides advice on the following relevant areas - erosion and sediment control, chemical use and management mechanical servicing and operational management practices.

A key risk during construction for this project is sediment mobilisation, which may result in increased turbidity in the Collie River. Whilst previous reference has been made to the department's SW Region '*Water resource considerations for extractive industries (2014)*', this document is for longer term extractive industries, as opposed to shorter term road construction works. As such the criterion therein is not appropriate to use in this situation.

Good sediment management will be critical, and can be achieved through appropriately located material stockpile areas; management of runoff around stockpile areas, temporary drainage to divert catchment runoff around high risk earthwork areas; use of silt curtains and straw bales in existing flow channels; and where there are no defined channels, construction of temporary detention areas. Upon completion of site works a rehabilitation plan is also recommended to ensure that disturbed areas are revegetated to avoid the risk of erosion and sediment mobilisation.

Long term water quality management is best achieved by applying the principles of the department's *Stormwater management manual for Western Australia (2007-9)*. Catchment runoff is from a well vegetated landscape and low risk. However, pavement runoff is likely to contain hydrocarbon and heavy metals.

The department promotes the use of kerbless roads allow direct sheet runoff open drainage systems, vegetated where practical. Prior to discharge from these roadside drains into catchment

flow paths that have a direct connection with the Collie River, it is recommended to install a hydrocarbon trap. This may be achieved in a relatively simple low maintenance and low cost manner using upturned box culverts with a baffle system. This approach has been used on the Forrest Highway and other Main Roads WA projects.

### Flood advice

The DoW, in carrying out its role in floodplain management, provides advice and recommends guidelines for development on floodplains with the object of minimising flood risk and damage. The DoW uses the following guiding principles to ensure proposed development in flood prone areas is acceptable with regard to major river flooding:

- proposed development has adequate 1 in 100 AEP flood protection
- proposed development does not detrimentally impact on the existing 1 in 100 AEP flooding regime of the general area

It is noted that the proposed alignment will intersect with the flood way approximately 300m downstream of where the Bowelling-Duranillin Road crosses the Collie River, and modelling should be undertaken to assess the changes to the flood regime and risk to this existing crossing.

### Surface and groundwater licenses and permits

The subject property is located within the Collie River Irrigation District as proclaimed under the *Rights in Water and Irrigation Act 1914*. Any taking or diversion of surface water in this proclaimed area (whether by direct pumping, construction of a dam, or excavation) can be subject to licensing. Any interference of the watercourse (such as the construction of a dam or crossing, or excavation of the watercourse) will require a *permit to interfere with the bed or banks* from the department.

Prior to submitting an application for a *permit to interfere with the bed or banks* the department advises that the proposal is within the Wellington Dam Catchment Area declared under the *Country Areas Water Supply Act 1947*. The department recommends that any clearing of native vegetation should initially be assessed under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* before being assessed under the *Country Areas Water Supply Act 1947*.

The subject property is located within a 'non-proclaimed' area for ground water under the *Rights in Water and Irrigation Act 1914*. The presence and yield of groundwater in these areas is not guaranteed and as such, test holes should be drilled to locate a suitable supply. Abstraction of groundwater from artesian aquifers (from which water naturally flows, or has flowed, to the surface without the need for pumping) is subject to licensing from the department. A license is not required for abstraction from non-artesian groundwater resources.

### **Recommendations**

In summary:

- Apply construction practises as outlined in *Water Quality Protection Note 44 Roads near sensitive water resources (2006)*.
- Manage both stockpile and earthwork areas to minimise the risk of sediment mobilisation into catchment flow paths, e.g. temporarily divert catchment runoff, use of straw bales, etc.
- Rehabilitate disturbed areas upon completion of site works.
- Maximise the use of kerbless roads and open roadside drainage, and install hydrocarbon trap on roadside drainage prior to discharge into tributaries to the Collie River (culverts located at Chainage 67200m and 66775m).

- Modelling impacts to the flood regime and the risk to the Bowelling-Duranillin Road Collie River crossing.
- Have any vegetation removal assessed in accordance with the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, and then if applicable under the *Country Areas Water Supply Act 1947*.
- Submitting an application for a permit to interfere with the bed or banks.
- Consider where construction water will be sourced, and whether a licence will be required.

Yours faithfully,

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Krish Seewraj  
Phone: 08 9726 4137  
Internal Ext: 1137  
Postal: PO Box 261, Bunbury, WA 6231



# Appendix D

## Bed and Banks Permit

File No: RF8242-02



Government of Western Australia  
Department of Water

Page 1 of 1

Instrument No. PMB183029(1)

### PERMIT TO OBSTRUCT OR INTERFERE (S17)

Granted by the Minister under section 17 of the Rights in Water and Irrigation Act 1914

Permit Holder(s)	Main Roads	
Description of Water Resource	Collie River East Branch Collie River East Branch	
Location of Water Source	E70/3456	
Authorised Activities	Activity	Location of Activity
	Modification of Collie-Lake King Road in the vicinity of the junction with the Bowelling-Duranillin Road by realigning a 5km stretch of the road.	E70/3456
Duration of Permit	From 9 August 2016 to 4 December 2018	

This Permit is subject to the following terms, conditions and restrictions:


- 1 The permit holder must undertake the works authorised by this permit with minimal disturbance to vegetation.
- 2 The permit holder shall ensure that the road realignment does not act as an artificial barrier or levee, causing water to pond upstream.
- 3 The permit holder is to comply with the description of works documentation received with the application and any amendments made by or with the approval of the Department.

End of terms, conditions and restrictions


This Permit is granted subject to the Rights in Water and Irrigation Regulations 2000

# Appendix E

## Hygiene Management Plan

 Department of Parks and Wildlife	<b>Hygiene Management Plan <i>Phytophthora cinnamomi</i></b> <b>Management Plan &amp; Weed Management Plan</b>	<b>FORM</b> <b>DPaWFEM031</b>
<b>District: Wellington</b>		<b>Plan &amp; Map ID Number:</b> <b>Bowelling Curves MRD Mgt 2016 75 A2 v1</b>
<b>Objective: To ensure that approved human activities within the 'protectable' areas of Bowelling Curves Project Area in Bowelling forest block are inconsequential as vectors for the establishment of new centres of infestation of <i>Phytophthora cinnamomi</i>.</b>		
<b>This Plan Only Applies to operation/ Works(s): Clearing, Road building and Rehabilitation activities</b> <b>Recheck Date: 9 October 2016 (+1 Year of Occurrence Map) Expiry Date: 9 October 2018 (+3 Years of Occurrence Map)</b>		
<b>Tactics for Management of the Area</b> <small>All operations to be in accordance with 'Phytophthora cinnamomi' and disease caused by it. V1 - Management Guidelines'        Circle and complete action (NO may be used for actions that are non-applicable)</small>		
<b>ACTION</b>	<b>ACTIVITIES</b>	
<b>1 YES</b>	<b>The 'protectable' areas and their boundaries have been established in the field and are identified as P1 to P5 on the attached map.</b>	
<b>2 NO</b>	<b>Areas that are predicted high impact and infested or unprotectable are identified on the attached map and marked in the field for retention and promotion of resistant species and individuals.</b>	
<b>3 YES</b>	<b>The proponent shall identify the applicable points on a map:</b> <ul style="list-style-type: none"> <li>• Clean on entry points (COE): No. _____</li> <li>• Clean on entry points with gates ( COE with 'Gate' ): No. _____</li> <li>• Wash down locations (W): No. _____</li> <li>• Road drainage points (D): No.D1 to D5</li> <li>• Roads/areas with no soil movement ( ): No. _____</li> <li>• Road Closure (X): No. _____</li> <li>• Management Point (M): No. _____</li> <li>• Turnarounds, 'not effectively quarantined roads' and roads for rehabilitation (map legend )</li> </ul>	
<b>4 NO</b>	<b>The roads marked _____ on the attached map will only be used when vehicles and machines will not pick up and move soil along them.</b>	
<b>5 NO</b>	<b>The proponent is to close roads TYPE _____ within the protectable area to specified standard prior to the operation commencing and X _____ to TYPE 7 during the operation.</b>	
<b>6 NO</b>	<b>COE signs will be installed prior to operation commencing at:</b> COE point _____ 'Clean on entry fellers block signage' COE point _____ 'Access all vehicles' COE point _____ 'No soil movement'	
<b>7 NO</b>	<b><i>Phytophthora cinnamomi</i> permanent management gates _____ will be installed by DPaW. Temporary management gates _____ and all signage to be installed by the proponent prior to operation commencing.</b>	
<b>8 NO</b>	<b>Clean down points will be installed prior to the operation commencing to ensure vehicles can be cleaned before entering the 'protectable' area.</b>	
<b>9 NO</b>	<b>Turnarounds at the clean down points will be installed prior to the operation commencing so vehicles can turn around without entering the 'protectable' area.</b>	
<b>10 YES</b>	<b>Road drainage entering forest near the 'protectable' areas at the points marked D1 to D5 on the attached map is to be redirected by the proponent away from the 'protectable' areas at each operational phase including clearing, topsoil removal, construction to design and topsoil replacement.</b>	
<b>11 NO</b>	<b>Entry into the protectable areas is via the permanent entry points COE _____ and/or temporary COE entry points _____</b>	
<b>12 NO</b>	<b>COE points _____ will be closed to the specified standard when operation has ceased for _____ weeks</b>	
<b>13 NO</b>	<b>At the completion of _____ activities all temporary COE are closed and rehabilitated to TYPE 3 and turnaround no. _____ to TYPE 5 by the proponent.</b>	
<b>14 NO</b>	<b>The proponent is to close roads X _____ to TYPE: _____ and rehabilitate roads _____ to standard _____ within the protectable area within _____ weeks of completion of operation.</b>	

Effective from: 3 April, 2009  
 Last updated: 28 August, 2013  
 Custodian: Manager, Ecosystem Health Branch  
 Approved by: Director, Nature Conservation

 Department of Parks and Wildlife	<b>Hygiene Management Plan <i>Phytophthora cinnamomi</i></b> <b>Management Plan &amp; Weed Management Plan</b>	<b>FORM</b> <b>DPaWFEM031</b>
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Plan and Map ID Number: Bowelling\_Curves\_MRD\_Mgt\_2016\_75\_A2\_v1

15	NO	Only uninfested basic raw materials will be used for all earthworks within the 'protectable' areas and/or in-situ BRM in uninterpretable areas.
16	YES	The proponent will ensure that vehicles, machines and equipment are clean when entering 'protectable' areas and a written record of inspections and/or cleardown is maintained and available to authorised P&W and MRWA staff.
17	YES	Cross contamination from infested areas into uninfested areas will not occur where work methods involve machines or vehicles working at demarcated management boundaries.
18	YES	All COE signage, turnarounds, gates, clean down points and drainage and other management points will be effectively maintained during the operation by the proponent.
<b>19. Other hygiene tactics or requirements</b> Specify additional requirements. Include all requirements from the HMP Meeting: e.g. split phase harvesting, specified frequency of COE monitoring, areas excluded from harvest ..... ..... ..... ..... Define requirements at Management Point: M <sub>1</sub> ..... M <sub>2</sub> ..... M <sub>3</sub> .....		

**Objective:** To ensure activities are inconsequential as vectors for the establishment and spread of Declared, Prohibited and High to Moderately rated environmental weeds.

Tactics for Management of the Area		
Circle and complete action (NO may be used for actions that are non-applicable)		
ACTION	ACTIVITIES	
1	YES NO	The proponent will clean down machinery when leaving areas infested with Declared/Prohibited or High to Moderate rated environmental weeds marked _____ on the map.
2	YES NO	Machinery will not enter areas infested with Declared/Prohibited or Moderate to High Environmental weeds marked _____ on the map.

Recommended by proponent: Copy provided: Yes			
..... (PRINT NAME)	..... (POSITION)	..... (SIGNATURE)	..... (DATE)
Plan approved by P&W:			
..... (PRINT NAME)	..... (POSITION)	..... (SIGNATURE)	..... (DATE)

Effective from: 3 April, 2009  
 Last updated: 28 August, 2013  
 Custodian: Manager, Ecosystem Health Branch  
 Approved by: Director, Nature Conservation

## Appendix F

### Environmental Management Plan

#### BOWELLING CURVES

#### Introduction

This Environmental Management Plan (EMP) has been developed for the project area following the completion of the impact assessment report. The aim of this EMP is to minimise the environmental impacts associated with the proposed works as well as to identify areas of responsibilities required for the implementation of management strategies.

This EMP addresses specific issues that were identified during the impact assessment. The project management measures identified within this EMP are in addition to the standard environmental management contract specifications used for Category 2 projects. Main Roads' standard environmental contract specifications (Specifications 203, 204, 301, 302 and 304) are to be adhered to where appropriate.

The areas that require special management will be addressed in terms of:

- the timing of the various management actions;
- the topic (e.g. vegetation);
- the actions that are necessary to minimise the impact; and
- the responsible party for implementing the action.

#### Communication Plan

Environmental issues specific to the project will be communicated as follows:

Method	Frequency	Participants	Record
Main Roads induction	Prior to work	All personnel and subcontractors	Induction Records
Kick off meeting	Prior to work	All personnel and subcontractors	Meeting minutes
Site Induction	When new people come onto site	All personnel and subcontractors	Induction Records
Toolbox Meetings	Weekly	Project Personnel	Minutes of Meeting
Contract Meetings	As required	Main Roads' Project Manager and Contractor Project Manager	Minutes of Meeting
Department of Environment Regulation	As required	Main Roads' Project Manager and Contractor Project Manager	Minutes of meeting

#### External Communication and Complaints

A complaints register shall be maintained by the contractor. All complaints received shall be forwarded to the Main Roads' Project Manager for action. Serious complaints shall be investigated within 24 hours of the complaint being received.

#### Contingency Measures

Contingency measures will be applied as required in response to an incident and upon the direction of the Manager Environment.

#### Auditing

The implementation of this EMP will be audited by the Project Manager or the Environment Officer during the construction phase.

ENVIRONMENTAL MANAGEMENT PLAN				
Project Component	Management Action	Record keeping/evidence	Responsible Person	Completion Timeframe
<i>Standard Record Keeping Management</i>				
Environmental Communication	<ul style="list-style-type: none"> <li>Pre-starts are to include environmental issues for the phase of works being conducted.</li> <li>Evidence of environmental aspects in pre-starts will be presented to the Environment Officer during the audit.</li> </ul>	Pre-start documentation  Environmental audit	Contractor	During works
Incident Reporting	<ul style="list-style-type: none"> <li>All environmental incidents associated with works under the Contract shall be immediately reported to the Superintendent.</li> </ul>		Construction Contractor	During works
	<ul style="list-style-type: none"> <li>The Contractor shall provide a detailed report of all incidents using the form obtained from Main Roads' web site, internet address: <a href="http://www.mainroads.wa.gov.au">http://www.mainroads.wa.gov.au</a> - under; Environment / Incident Reporting and Investigation.</li> <li>The Contractor shall submit the completed form to the Superintendent within 5 days of the incident occurring and provide copies of all reports and information associated with the incident to the Superintendent.</li> </ul>		Construction Contractor	
Compliance Auditing	<ul style="list-style-type: none"> <li>Compliance with management measures detailed in this EMP shall be monitored throughout the construction of the project.</li> </ul>	Audits of compliance with the EMP shall be conducted weekly.	Construction Contractor	
Emergency Response Plan	<ul style="list-style-type: none"> <li>The Emergency Response Plan includes contact phone numbers and appropriate response to environmental incidents covering hydrocarbon spills, dust events, turbid water and ground contamination, vegetation and streambed disturbance etc.</li> </ul>	Emergency Response Plan	Contractor	During works
Environmental Health and Safety Management Policy	<ul style="list-style-type: none"> <li>Copy of Contract specific EHS Management Policy is available on site and policy on display on site office / crib room notice board – communicated and accessible to all employees and sub contractors working on site</li> </ul>	EHS Management Policy	Contractor	During works
<i>Project Specific Aspects</i>				
Aboriginal Heritage Sites	<ul style="list-style-type: none"> <li>In the event that human skeletal material is uncovered, work will cease within 25 metres of</li> </ul>	SEMP/CEMP	Contractor	Project lifespan

ENVIRONMENTAL MANAGEMENT PLAN				
Project Component	Management Action	Record keeping/evidence	Responsible Person	Completion Timeframe
	<p>the material and the location of the material reported to Police.</p> <ul style="list-style-type: none"> <li>In the event that artefacts or material of Aboriginal origin is discovered, work will cease within 25 metres of the material and a qualified archaeologist will investigate the item(s) and take appropriate actions (i.e. contact DAA).</li> <li>Liquid spills, stormwater and runoff materials will be managed to ensure project activities and drainage do not adversely affect heritage sites or any wetland or water body.</li> </ul>			
Dieback	<ul style="list-style-type: none"> <li>Clean down on entry will be checked by the Department of Parks and Wildlife prior to start of works (if available) for initial mobilisation.</li> <li>All plant will have clean down on entry certificates at the start of project, which will be present on site at all times for inspection.</li> <li>All vehicles, machinery and equipment must be clean when entering protectable areas as per the attached map. Shapefiles can be provided to the contractor upon request. Written records must be maintained and available to DPaW or MRWA staff.</li> <li>Dieback control will be included in the project induction for all staff as well as prestart and toolbox meetings.</li> <li>Clean on entry signs will be put up as required.</li> <li>The Hygiene Management Plan will be complied with for this project.</li> <li>Cross contamination between infested and uninfested areas is not permitted. This includes movement of soil on tyres and dirty vehicles.</li> <li>The contractor will ensure that drainage from clean down on entry locations do not drain into protectable areas. Protectable and non-protectable areas will be clearly marked on site.</li> </ul>	<p>SEMP/CEMP</p> <p>Clean down on entry certificates</p> <p>Project induction</p> <p>Hygiene Management Plan</p>	<p>Project Manager</p> <p>Environment Officer</p> <p>Contractor</p>	Project lifespan

ENVIRONMENTAL MANAGEMENT PLAN				
Project Component	Management Action	Record keeping/evidence	Responsible Person	Completion Timeframe
Weeds	<ul style="list-style-type: none"> <li>Cape Tulip infestations will be removed prior to works.</li> <li>Soil from the Cape Tulip infested area will be marked on-ground prior to works, and removed to spoil to prevent the spread of this species.</li> </ul>	Spray records  SEMP/CEMP	Environment Officer  Contractor	Prior to works  Project lifespan
Dust	<ul style="list-style-type: none"> <li>Apply dust suppression techniques to sealed roads on or near the project site that are affected by excessive dust.</li> <li>Water tankers will be made available to dampen exposed surfaces within construction and laydown areas, particularly during ground disturbing activities.</li> <li>Minimise or cease project activities during periods of high wind or when excessive dust is generated.</li> <li>Apply water, road sweeping and signage for suitable speed limits will be used during vehicle movement.</li> </ul>	SEMP/CEMP    Traffic Management Plan	Contractor	Project lifespan
Pollution and Litter	<ul style="list-style-type: none"> <li>All waste materials from the project area will be removed from the site upon completion of the project and to the satisfaction of the Project Manager or Site Superintendent.</li> </ul>	Close out inspection	Contractor and Project Manager	Close out
	<ul style="list-style-type: none"> <li>Construction waste and other rubbish will be contained in bins with lids (where practicable) and removed regularly.</li> <li>Contractors to provide receipts from tips for spoil disposal.</li> <li>Spoil stockpiles will not be located directly adjacent to the watercourse, and spoil will not be in a location where it can wash into the river in heavy rainfall.</li> </ul>	SEMP/CEMP  Environmental Audit	Contractor Environment Officer/ Project Manager	Project lifespan
Noise and Vibration	<ul style="list-style-type: none"> <li>Ensure compliance with all applicable statutory requirements.</li> <li>Limit construction activity to normal business hours and liaise with the local Shire/LGA if construction activities are required outside of these hours.</li> <li>Communicate the need to undertake out of hours project activities to the community, if necessary.</li> <li>Undertake compaction operations during</li> </ul>	Noise Management Plan (if required)    Stakeholder consultation log	Contractor/Project Manager	Project lifespan





ENVIRONMENTAL MANAGEMENT PLAN				
Project Component	Management Action	Record keeping/evidence	Responsible Person	Completion Timeframe
	<p>designated areas, at least 100 m away from watercourses.</p> <ul style="list-style-type: none"> <li>No refuelling within 50 m of the watercourse and refuelling will only be undertaken at the designated refuelling location by a person trained in refuelling. Refuelling activities must be covered by a SHEWMS.</li> <li>Auto greaser to be set to correct setting so as not to drip grease.</li> <li>Hydraulic hoses to be fastened to prevent risk of hydraulic hose tear.</li> <li>Refuelling of stationary plant such as generators shall be undertaken in a mobile bunded area, or alternatively a bunded generator may be used. If refuelling of stationary equipment adjacent to the watercourse, this shall be done by hand with limited amounts of hydrocarbons to reduce the risk and impact of a spill.</li> <li>Site personnel shall be trained in the use of emergency fire suppressant equipment.</li> <li>Spill trays will be available near fuel storage or refuelling areas. Spill kits to be present and fully equipped</li> <li>Plant shall not be left unattended when re-fuelling.</li> <li>All hazardous material spills will be reported according to statutory requirements and to the Principal immediately.</li> <li>Bunded area to be used for concrete washdown.</li> <li>Hazardous materials will be disposed of at an approved and certified facility.</li> <li>Temporary storage of bitumen, asphalt, concrete or aggregate shall occur at designated depots or controlled hardstands located within the project area, and not within 100 m of the watercourse.</li> </ul>	<p>SHEWMS</p> <p>Incident Reporting</p>		
Fire	<ul style="list-style-type: none"> <li>No fires shall be lit within the project area.</li> <li>All vehicles, plant and equipment to be fitted with fire extinguishers and restricted and to designated cleared areas.</li> </ul>	<p>Environmental Audit</p> <p>Incident Reports (If any)</p>	Contractor/Project Manager	Project lifespan

ENVIRONMENTAL MANAGEMENT PLAN				
Project Component	Management Action	Record keeping/evidence	Responsible Person	Completion Timeframe
	<ul style="list-style-type: none"> <li>Construction personnel will extinguish and report fires occurring within the project area.</li> </ul>			
Clearing	<ul style="list-style-type: none"> <li>Trees containing hollows will be pushed over slowly so as not to harm any animals inside, and checked prior to mulching.</li> <li>The clearing area will be pegged prior to clearing and checked by the Environment Officer or Project Manager.</li> <li>No clearing outside the pegged area is permitted.</li> <li>No clearing will be permitted for laydown areas.</li> <li>Topsoil will be stockpiled and respread after works in accordance with the Topsoil Management Plan. Dieback infested topsoil will not be spread into uninfested areas.</li> <li>Mulched vegetation will be spread over the backslopes to retain seed bank.</li> <li>All pruning operations of any vegetation for hazard reduction and or selective thinning of branches shall be undertaken in accordance with AS 4373.</li> <li>Branches protruding into the cleared area shall be neatly pruned by hand back close to the bole of the tree or main branches to minimise the disturbance to vegetation growing outside the limits of clearing.</li> <li>Trenches that have no escape route at one end shall be temporarily fenced to protect fauna from falling into the trench during non-work hours.</li> <li>Trenches shall be inspected each morning to ensure that no native fauna is trapped within open trenches.</li> </ul>	<p>Clearing records</p> <p>Environmental Audit</p>	<p>Environment Officer</p> <p>Project Manager</p> <p>Contractor</p>	Project lifespan
Fauna	<ul style="list-style-type: none"> <li>Soft starts will be implemented to allow fauna to vacate the clearing area prior to works.</li> <li>No pets brought to site.</li> <li>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.</li> <li>The two trees with hollows suitable for current</li> </ul>		Contractor	Project lifespan

ENVIRONMENTAL MANAGEMENT PLAN				
Project Component	Management Action	Record keeping/evidence	Responsible Person	Completion Timeframe
	use will be checked prior to clearing to ensure they are not in use. Any birds found will be retained until fledglings have left the nest, dependent upon time of year. Alternatively clearing will be undertaken outside the breeding season.		Environment Officer	

Dieback Control Map

