Brand Highway Widening and Passing Lane Package

Assessment Report and Vegetation Management Plan

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Contents

1 SUMMARY 4
1.1 Project Information 4
1.2 Key Clearing Impact Assessment Aspects 4
1.3 Key Vegetation Management Actions 5
2 ASSESSMENT SCOPE 6
3 PROJECT DESCRIPTION 7
3.1 Project Location 8
4 METHODOLOGY 24
4.1 Preliminary Desktop Study 24
4.2 Detailed Clearing Impact Assessment 24
5 CLEARING OF NATIVE VEGETATION 25
5.1 Measures to Avoid and Minimise Clearing 25
5.2 Vegetation Details 25
5.2.1 Project Vegetation Description 25
(Government of Western Australia, 2014) 35
5.3 Assessment against the Ten Clearing Principles 37
6 SUMMARY OF BIOLOGICAL SURVEYS 48
7 ADDITIONAL PRE CLEARING ACTIONS REQUIRED 57
8 VEGETATION MANAGEMENT 58
9 OTHER STAKEHOLDER CONSULTATION 58
10 REFERENCES 59
11 APPENDICES 60
Appendix A: DBCA Threatened Flora and Fauna Database Searches 61
Appendix B: Vegetation Management Plan 62

Amendments

Report Compilation & Review	Name and Position	Document Revision	Date
Author:	Emma Fitzgerald Environment Officer	Draft v1	13/2/2017
Reviewer:	V Clarke Senior Environment Officer	Draft v1	13/2/2017
Author:	Emma Fitzgerald Environment Officer	Rev 0	22/3/2017
Author:	Emma Fitzgerald Environment Officer	Rev 1	20/12/2017
Reviewer:	V Clarke Senior Environment Officer	Rev 1	20/12/2017
Author:	Emma Fitzgerald Environment Officer	Rev 2	20/3/2018

1 SUMMARY

1.1 Project Information

Project Title: Brand Highway Widening and Passing Lanes project 34.83-163.4 SLK

Project location(s): All the project locations are on Brand Highway:

Project type	SLK range	Shire	Clearing Area (ha)
Widening	65-68.63	Gingin	2.2
	71.02-74		1.8
	77.3-79.84	Dandaragan	1.6
	81.71-86		2.6
	120-136		6
	139-152		4.6
Northbound Passing Lane	34.83-36	Gingin	1.3
Southbound Passing Lane	68.63-71.02		2.7
Northbound Passing Lane	79.84-81.1	Dandaragan	2.1
Southbound Passing Lane	111.08-112.9		2.2
Northbound Passing Lane	113.6-115.94		2.2
Southbound Passing Lane	126.2-128.38		2.5
Northbound Passing Lane	159.8-163.6		6
Southbound Passing Lane	160.1-163.4		
TOTAL			**37.8**

Project purpose / components: This project involves widening sections of Brand Highway and the creation of four northbound and four southbound lanes between 65 and 163.4 SLK. This will increase the safety of the road by providing safe overtaking opportunities and improving the functionality of the road.

Temporary clearing required: None

A detailed Assessment Report (AR) of the project clearing activities was undertaken. The AR outlined the key activities associated with the road project, the existing environment and an assessment of native vegetation clearing. This assessment provided an evaluation of the vegetation clearing impacts associated with the project using the ten Clearing Principles and strategies used to manage vegetation clearing. Key items associated with the clearing assessment are listed below.

1.2 Key Clearing Impact Assessment Aspects

- This project involves the removal of up to 37.8ha to complete 14 projects along Brand Highway.
- This project was deemed:
  - May be at variance to Principle (a) as the project involves the removal of 22 priority flora species, 15.24ha of TEC and Carnaby's Black Cockatoo foraging habitat
  - At variance to Principle (b) as the project involves the removal of 34.29ha of foraging habitat and up to 51 potential breeding trees suitable for Carnaby's Black Cockatoo.
  - At variance to Principle (d) as the project involves the removal of up to 15.24ha of "Banksia Woodlands of the Swan Coastal Plain" Threatened Ecological Community.
  - At variance to Principle (e) as the project involves the removal of 1.3ha of native vegetation that is considered significant as a remnant in an extensively cleared landscape
  - At variance to Principle (f) as the project involves the removal of 0.27ha of riparian vegetation
  - Not likely to be at variance to the remaining Clearing Principles.

- Three biological surveys were completed for this project to cover the application area in 2016. A further targeted flora survey and threatened ecological mapping was completed in 2017.
- Works are to be completed in dry condition so dieback is not considered an issue. However if work schedule is changed and works in wet conditions are required a dieback survey will be commissioned and a dieback management plan will be submitted to/approved by DER prior to commencing clearing. Due to the ever changing nature of dieback mapping the surveys/dieback management plans will be completed the year each project component is scheduled to start.
- Advice from DWER stated that a bed and banks permit was not required for this project as the watercourse that intersects the application area is not in a proclaimed surface water area.

A submission from DWER advised that the biological supporting information was not of a standard to facilitate assessment. This revised AR includes subsequent floristic survey information to facilitate assessment of conservation significant flora and communities.

The Assessment Report identified environmental constraints associated with the proposed project activities. Further environmental approvals, permits or licences are needed for implementation of the project.

1.3 Key Vegetation Management Actions

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

- Clearing will be limited to the smallest possible area
- An Environmental specialist will remain on site during the clearing to ensure compliance
- Previously disturbed areas will be cleared rather than good condition vegetation where possible
- Clearing will be demarcated
- Clean earth moving machinery of soil and vegetation prior to entry to project areas adjacent to conservation areas.
- In project areas adjacent to conservation areas a post construction check will be completed and any weeds identified will be added into the annual weed program to monitor and remove the weeds.

A separate clearing permit will be obtained through the bilateral process which will be used to undertake native vegetation clearing for the project. Project clearing will be undertaken in accordance with the conditions of this permit and detailed records of native vegetation clearing will be maintained as required under the permit.

2 ASSESSMENT SCOPE

This environmental impact assessment involved a desktop analysis of environmental aspects and impacts, a site investigation, and an assessment of native vegetation clearing impacts. The study area is confined to a local area of a 20 km radius. This assessment determined the need to develop and obtain approvals from the Department of Water and Environment Regulation (DWER) for revegetation plans, vegetation management plans, dieback management plans or offset proposals.

3 PROJECT DESCRIPTION

This project involves the creation of four northbound and four southbound passing lanes within the Shires of Dandaragan and Gingin on Brand Highway.

Widening 65-68.63 SLK
This project will involve the widening of the road formation between 65 and 68.63 SLK to a seal/pavement configuration of 9m on 11m. This includes two 3.5m lanes, two 1m sealed shoulders and two 1m unsealed shoulders. To complete this work up to 2.2ha of native vegetation will be removed.

Widening 71.02-74 SLK
This project will involve the widening of the road formation between 71.02 and 74 SLK to a seal/pavement configuration of 9m on 11m. This includes two 3.5m lanes, two 1m sealed shoulders and two 1m unsealed shoulders. To complete this work up to 1.8ha of native vegetation will be removed.

Widening 77.3-79.84 SLK
This project will involve the widening of the road formation between 77.3 and 79.84 SLK to a seal/pavement configuration of 9m on 11m. This includes two 3.5m lanes, two 1m sealed shoulders and two 1m unsealed shoulders. To complete this work up to 1.6ha of native vegetation will be removed.

Widening 81.71-86 SLK
This project will involve the widening of the road formation between 81.71 and 86 SLK to a seal/pavement configuration of 9m on 11m. This includes two 3.5m lanes, two 1m sealed shoulders and two 1m unsealed shoulders. To complete this work up to 2.6ha of native vegetation will be removed.

Widening 120-136 SLK
This project will involve the widening of the road formation between 120 and 136 SLK to a seal/pavement configuration of 9m on 11m. This includes two 3.5m lanes, two 1m sealed shoulders and two 1m unsealed shoulders. To complete this work up to 6ha of native vegetation will be removed.

Widening 139-152 SLK
This project will involve the widening of the road formation between 139 and 152 SLK to a seal/pavement configuration of 9m on 11m. This includes two 3.5m lanes, two 1m sealed shoulders and two 1m unsealed shoulders. To complete this work up to 4.6ha of native vegetation will be removed.

Northbound Passing Lane 34.83-36 SLK
This project involves the construction of a northbound passing lane and the widening of the existing road including shoulder widening on the southbound side of the road from 34.83-36 SLK. This will involve the clearing of up to 1.3ha of native vegetation.

Southbound Passing Lane 68.63-71.02 SLK
This project involves the construction of a southbound passing lane and the widening of the existing road including shoulder widening on the northbound side of the road from 68.63-71.02 SLK. This will involve the clearing of up to 2.7ha of native vegetation.

Northbound Passing Lane 79.84-81.1 SLK
This project involves the construction of a northbound passing lane and the widening of the existing road including shoulder widening on the southbound side of the road from 79.84-81.1 SLK. This will involve the clearing of up to 2.1ha of native vegetation.

Southbound Passing Lane 111.08-112.9 SLK
This project involves the construction of a southbound passing lane and the widening of the existing road including shoulder widening on the northbound side of the road from 111.08-112.9 SLK. This will involve the clearing of up to 2.2ha of native vegetation.

Northbound Passing Lane 113.6-115.94 SLK
This project involves the construction of a northbound passing lane and the widening of the existing road including shoulder widening on the southbound side of the road from 113.6-115.94 SLK. This will involve the clearing of up to 2.2ha of native vegetation.

Southbound Passing Lane 126.2-128.38 SLK
This project involves the construction of a southbound passing lane and the widening of the existing road including shoulder widening on the northbound side of the road from 126.2-128.38 SLK. This will involve the clearing of up to 2.5ha of native vegetation.

Northbound Passing Lane 159.8-163.6 SLK and Southbound Passing Lane 160.1-163.4 SLK
This project involves the construction of a northbound passing lane between 159.8-163.3 SLK and the construction of a southbound passing lane between 160.1-163.4 SLK. The sections of road from 159.8-160.1SLK will be widened on the southbound side of the road and between 163.4 and 163.6SLK will be widened on the northbound side of the road. This will involve the clearing of 6ha of native vegetation.

These works will be completed over several successive years as budgetary resources are made available starting in 2018. The works will provide safe passing opportunities and increase the functionality of the road.

3.1 Project Location

The application areas occur at various sections along Brand Highway and are shown in Figures 1-13 with the following locations:

Widening 65-68.63 SLK within the Shire of Gingin
Start: Latitude: -31.0763
Longitude: 115.7524
End: Latitude: -31.0483
Longitude: 115.7332

Widening 71.02-74 SLK within the Shire of Gingin
Start: Latitude: -31.0282
Longitude: 115.725
End: Latitude: -31.0038
Longitude: 115.7119

Widening 77.3-79.84 SLK within the Shire of Dandaragan
Start: Latitude: -30.9765
Longitude: 115.6998
End: Latitude: -30.9569
Longitude: 115.6856

Widening 81.71-86 SLK within the Shire of Dandaragan
Start: Latitude: -30.9431
Longitude: 115.6746
End: Latitude: -30.913
Longitude: 115.6465

Widening 120-136 SLK within the Shire of Dandaragan
Start: Latitude: -30.6627

Longitude: 115.4665
End: Latitude: -30.5194
Longitude: 115.4634

Widening 139-152 SLK within the Shire of Dandaragan
Start: Latitude: -30.4979
Longitude: 115.4793
End: Latitude: -30.384
Longitude: 115.4962

Northbound Passing Lane 34.83-36 SLK within the Shire of Gingin
Start: Latitude: -31.3098
Longitude: 115.8686
End: Latitude: -31.2992
Longitude: 115.8689

Southbound Passing Lane 68.63-71.02 SLK within the Shire of Gingin
Start: Latitude: -31.0484
Longitude: 115.7332
End: Latitude: -31.0281
Longitude: 115.7249

Northbound Passing Lane 79.84-81.1 SLK within the Shire of Dandaragan
Start: Latitude: -30.957
Longitude: 115.6856
End: Latitude: -30.943
Longitude: 115.6746

Southbound Passing Lane 111.08-112.9 SLK within the Shire of Dandaragan
Start: Latitude: -30.7265
Longitude: 115.5206
End: Latitude: -30.7139
Longitude: 115.5084

Northbound Passing Lane 113.6-115.94 SLK within the Shire of Dandaragan
Start: Latitude: -30.7089
Longitude: 115.504
End: Latitude: -30.6959
Longitude: 115.4904

Southbound Passing Lane 126.2-128.38 SLK within the Shire of Dandaragan
Start: Latitude: -30.6067
Longitude: 115.4666
End: Latitude: -30.5873
Longitude: 115.4631

Northbound Passing Lane 159.8-163.6 SLK within the Shire of Dandaragan
Start: Latitude: -30.3199
Longitude: 115.471
End: Latitude: -30.2878
Longitude: 115.4756

Southbound Passing Lane 160.1-163.4 SLK within the Shire of Dandaragan
Start: Latitude: -30.3172
Longitude: 115.4713
End: Latitude: -30.2895

Figure 1 – Application Area Widening 65-68.63 SLK

Figure 2 – Application Area Widening 71.02-74 SLK

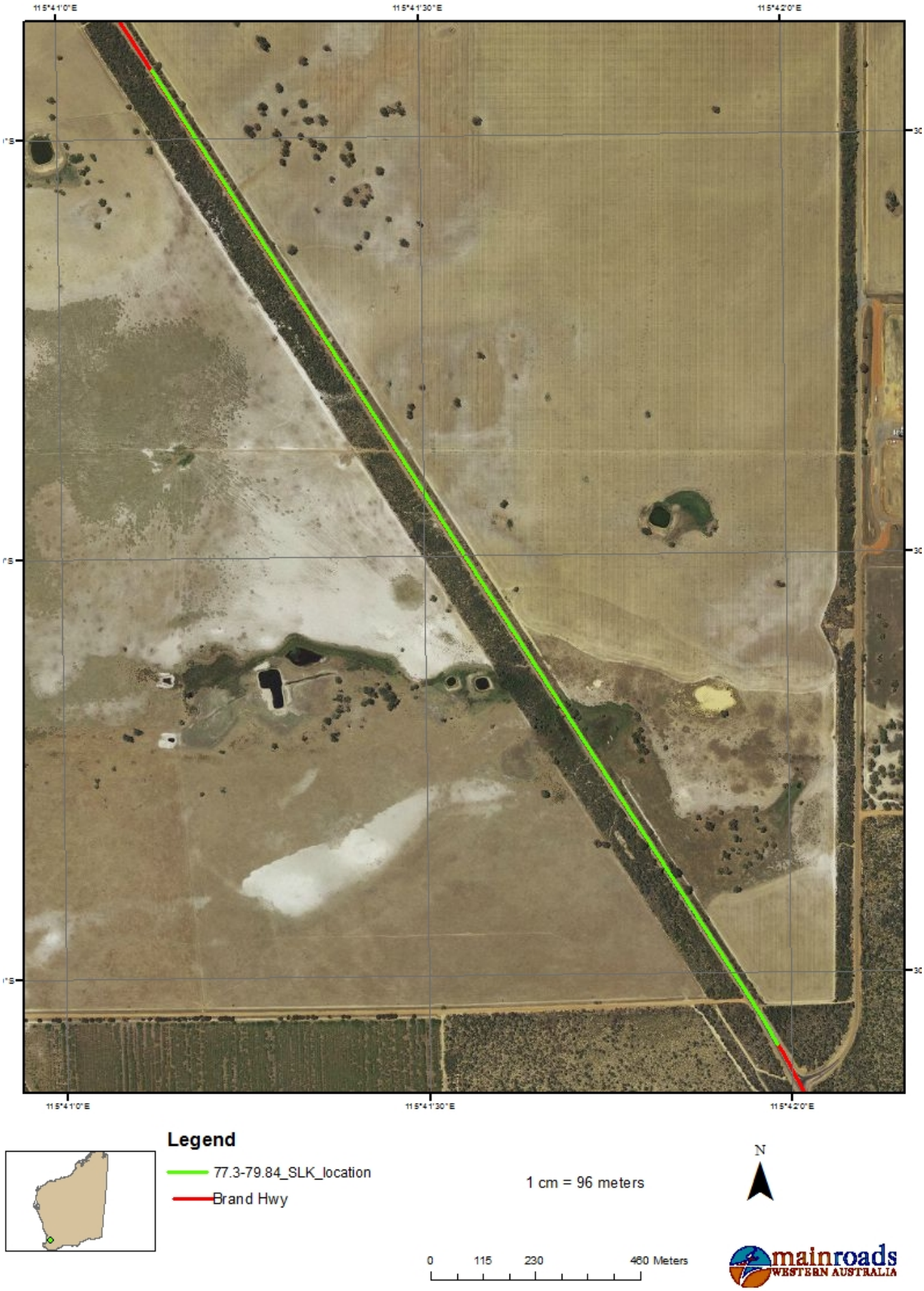

Figure 3 – Application Area Widening 77.3-79.84 SLK

Figure 4 – Application Area Widening 81.71-86 SLK

Figure 5 – Application Area Widening 120-136 SLK

Figure 6– Application Area Widening 139-152 SLK

Figure 7 – Application Area Northbound Passing Lane 34.83-36 SLK

Figure 8 – Application Area Southbound Passing Lane 68.63-71.02 SLK

Figure 9 – Application Area Northbound Passing Lane 79.84-81.1 SLK

Figure 10– Application Area Southbound Passing Lane 111.08-112.9 SLK

Figure 11 – Application Area Northbound Passing Lane 113.6-115.94 SLK

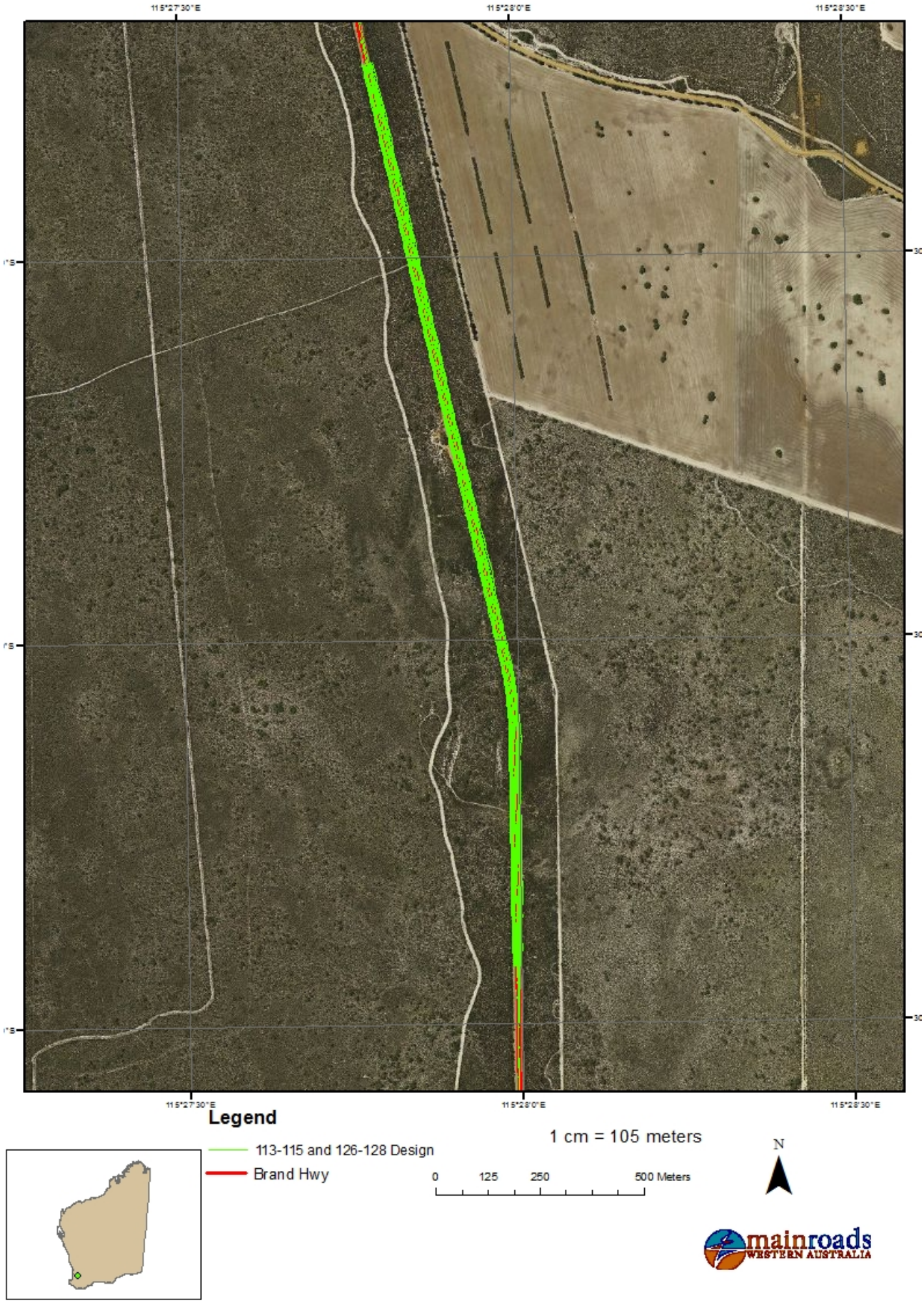

Figure 12 – Application Area Southbound Passing Lane 126.2-128.38 SLK

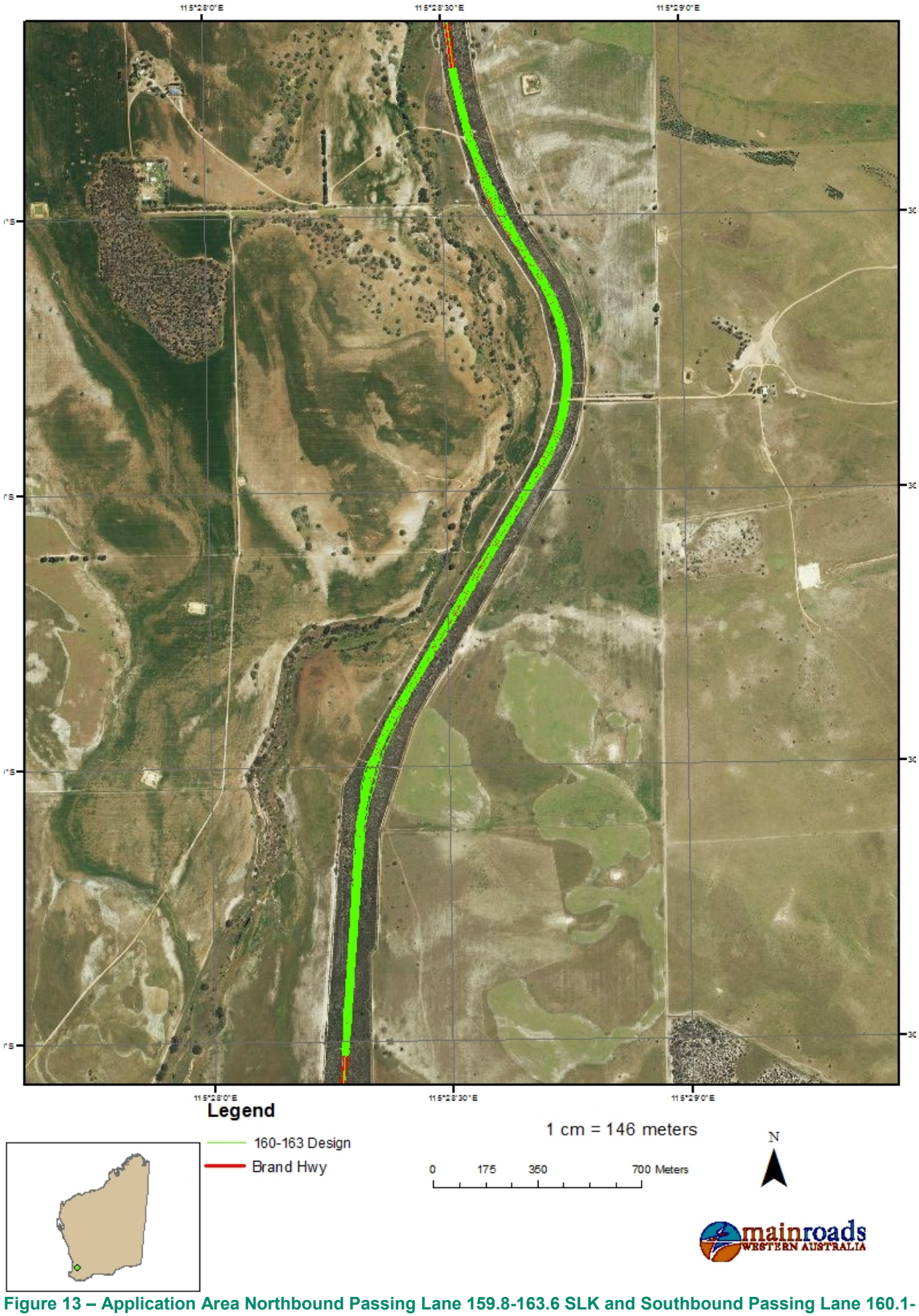

Figure 13 – Application Area Northbound Passing Lane 159.8-163.6 SLK and Southbound Passing Lane 160.1-163.4 SLK

The location and boundaries of the study area (20 km radius) for the project are shown in Figure 14:

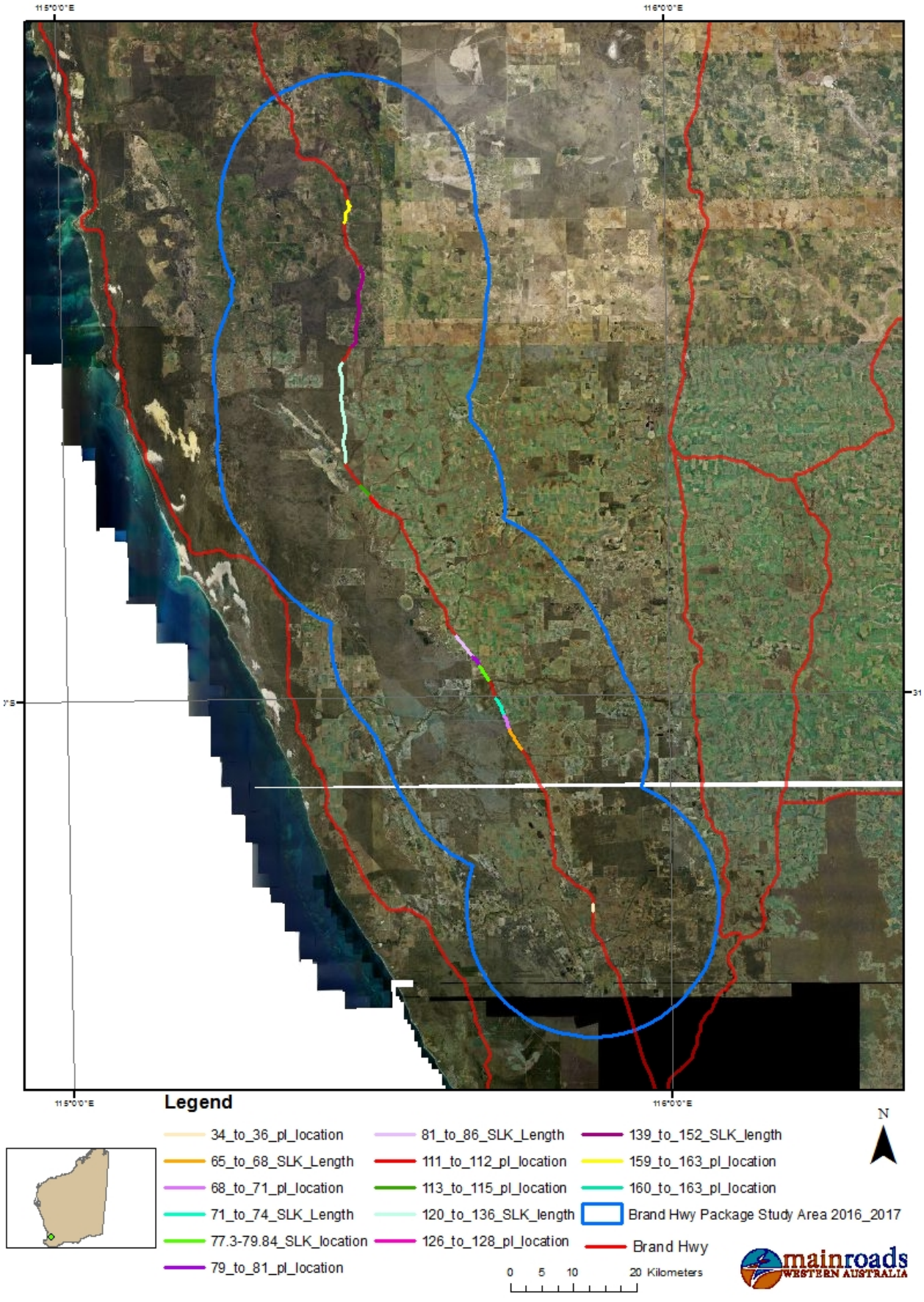

Figure 14 – Project Location and Study Area

4 METHODOLOGY

4.1 Preliminary Desktop Study

An initial preliminary desktop assessment was undertaken to assess the proposed native vegetation clearing and potential constraints associated with the project. The desktop assessment included viewing GIS shapefiles, reviewing government agency managed databases (where necessary) and consulting with relevant stakeholders. The outcome of the desktop study, identified that native vegetation clearing was at variance with one or more of the clearing principles.

4.2 Detailed Clearing Impact Assessment

Further environmental assessment of the impacts of native vegetation clearing was undertaken and an Assessment Report (AR) completed. The AR included a site visit to verify desktop information and a biological survey to delineate key environmental elements of the application area. A summary of the outcome of the survey is provided in Section 6~~5~~. The methodology used for the biological survey is provided in the Biological Survey report in D16#715905 (Astron 2016), D16#350127 (GHD 2016), D16#728602 (GHD 2016), Woodman targeted flora report (2017) and the Ecologia draft threatened ecological community mapping report (2018). The finals of the threatened ecological community mapping report will be sent through when they are completed.

The methodology used when completing an assessment of the clearing principles is provided in Section 4.3. Mapping was completed using ArcGIS.

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 WA will be undertaken using a permit.

5.1 Measures to Avoid and Minimise Clearing

Justification for how project design was chosen.

- Feasibility of alignment and need to meet Australian standards.
- Increasing road safety through passing lane and widening
- Allow adequate site distance for passing lanes.
- Cost versus environmental constraints.

Explain how the clearing impacts have been avoided and minimised.

- The clearing area will be demarcated prior to the commencement of project activities and prior to the commencement of native vegetation clearing.
- Further project clearing will be avoided as the site office, materials storage areas, construction vehicles/machinery and access tracks will be located on previously disturbed or cleared areas.
- The project design was refined to the smallest possible area.

5.2 Vegetation Details

5.2.1 Project Vegetation Description

The application areas are predominately composed of sands, with small areas ranging from sandy and loamy earths to clay.

Widening 65-68.63 SLK
This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in very good condition. The application area is comprised of 3 vegetation types:

Highly modified
Includes areas that have been predominantly cleared but which still contain either scattered natives or introduced species. These include bulldozed firebreaks that contain seed and which may support occasional native species

Banksia attenuata and *B. menziesii* woodland
Woodland of *Banksia menziesii* and *B. attenuata* over sparse tall shrubland of *Adenanthos cygnorum, Jacksonia floribunda* and *Xanthorrhoea preissii* over low shrubland of *Bossiaea eriocarpa, Eremaea pauciflora, Stirlingia latifolia* and open sedgeland of *Lyginia barbata, Alexgeorgea nitens* and *Mesomelaena pseudostygia* over sparse herbland of *Haemodorum* sp., *Drosera erythrorhiza* and *Dampiera linearis*

Banksia Woodland
Banksia attenuata and *B. menziesii* low woodland over *Adenanthos cygnorum subsp. cygnorum and Eremaea pauciflora var. pauciflora* open shrubland over *Stirlingia latifolia* low open shrubland over *Mesomelaena pseudostygia* very open sedgeland.

Widening 71.02-74 SLK
This application area is in excellent to degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition. The application area is comprised of 6 vegetation types:

Melaleuca preissiana Woodland
Woodland of *Melaleuca preissiana* over tall shrubland of *M. incana* subsp. *incana, Hypocalymma angustifolium, Gastrolobium obovatum* over closed sedgeland of *Gahnia trifida, Juncus kraussii* subsp., *australiensis, Schoenus caesipitius* over sparse herbland of *Laxmannia ramosa* subsp. *ramose, Drosera erythrorhiza, Isotropis cuneifolia* subsp. *cuneifolia*

Highly modified
Includes areas that have been predominantly cleared but which still contain either scattered natives or introduced species. These include bulldozed firebreaks that contain seed and which may support occasional native species

Banksia attenuata and *B. menziesii* woodland
Woodland of *Banksia menziesii* and *B. attenuata* over sparse tall shrubland of *Adenanthos cygnorum, Jacksonia floribunda* and *Xanthorrhoea preissii* over low shrubland of *Bossiaea eriocarpa, Eremaea pauciflora, Stirlingia latifolia* and open sedgeland of *Lyginia barbata, Alexgeorgea nitens* and *Mesomelaena pseudostygia* over sparse herbland of *Haemodorum* sp*., Drosera erythrorhiza* and *Dampiera linearis*

Banksia Woodland
Banksia attenuata and *Banksia menziesii* low woodland over A*denanthos cygnorum subsp. cygnorum* and *Eremaea pauciflora var. pauciflora* open shrubland over *Stirlingia latifolia* low open shrubland over *Mesomelaena pseudostygia* very open sedgeland.

Pl04
Eucalyptus todtiana, Banksia attenuata and *Banksia menziesii* low open woodland over *Xanthorrhoea preissii* open shrubland over *Hibbertia crassifolia, Eremaea pauciflora var. pauciflora* and *Allocasuarina humilis* low shrubland over *Mesomelaena pseudostygia* and *Tetraria octandra* very open sedgeland.

Pl05
Corymbia calophylla low open forest over *Xanthorrhoea preissii* and *Hakea trifurcata* open shrubland over *Bossiaea eriocarpa* and *Jacksonia sternbergiana* low shrubland over *Mesomelaena pseudostygia* and *Caustis dioica* open sedgeland.

Widening 77.3-79.84 SLK

This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition. The application area is comprised of 6 vegetation types:

Banksia attenuata and *B. menziesii* woodland
Woodland of *Banksia menziesii* and *B. attenuata* over sparse tall shrubland of *Adenanthos cygnorum, Jacksonia floribunda* and *Xanthorrhoea preissii* over low shrubland of *Bossiaea eriocarpa, Eremaea pauciflora, Stirlingia latifolia* and open sedgeland of *Lyginia barbata, Alexgeorgea nitens* and *Mesomelaena pseudostygia* over sparse herbland of *Haemodorum* sp*., Drosera erythrorhiza* and *Dampiera linearis*

Banksia Woodland on White Sand
Low Open Woodland dominated by *Banksia attenuata, B. menziesii* with *Eucalyptus todtiana* over Scattered Shrubs of *B. attenuata, Jacksonia floribunda* over Low Shrubland to Open Shrubland of *Melaleuca urceolaris a*nd *Eremaea pauciflora* over Sedgeland of *Desmocladus subterranea, Xanthorrhoea priessii* over herbs *Trachymene pilosa, Podotheca angustifolia, Burchardia congesta, Pterostylis dilatata* on White Sand.

Cleared/ Degraded

Includes existing clearing road reserve, gravel pits, tracks and firebreaks. Often comprises Scattered Shrubs over Scattered Bunch introduced grass and Scattered Herbs.

Geomorphic Wetland
Trees of *Corymbia calophylla, Melaleuca priessiana* over Shrubs of *M. priessiana, M. incana, Hypocalymma angustifolium* over Sedgeland of *Lepidosperma squamatum, *Cyperus congestus*

Marri Banksia Woodland
Woodland of *Corymbia calophylla* over Low Woodland of *Banksia attenuata, Banksia prionotes* over High Open Shrubland of *Allocasuarina humilis, Nuytsia floribunda* over Scattered Shrubs of *Jacksonia horrida, Hibbertia hypericoides* over Low Shrubland of *Calothamnus sanguineus, Acacia pulchella* var*. glaberrima, Banksia nivea* over Open Sedgeland of *Caustis dioica, Mesomelaena pseudostygia* over Scattered Herbs of *Cassytha flava, Haemodorum brevisepalum.*

Heath and Emergents
Scattered Low Trees of *Banksia attenuata, Eucalyptus todtiana* over Scattered Heath of *Leucopogon oldfieldii, Astroloma xerophyllum, Hibbertia aurea, Hakea obliqua, H. ruscifolia, Melaleuca trichophylla* over Low Shrubland of *Conostylis, Calothamnus sanguineus* over Very Open Sedgeland of *Mesomelaena pseudostygia, Desmocladus subterranea, Lyginia barbarta* over Scattered Herbs of *Drosera spp.* and *Burchardia congesta.*

Widening 81.71-86 SLK

This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition. The application area is comprised of 7 vegetation types:

Banksia attenuata and *B. menziesii* woodland
Woodland of *Banksia menziesii* and *B. attenuata* over sparse tall shrubland of *Adenanthos cygnorum, Jacksonia floribunda* and *Xanthorrhoea preissii* over low shrubland of *Bossiaea eriocarpa, Eremaea pauciflora, Stirlingia latifolia* and open sedgeland of *Lyginia barbata, Alexgeorgea nitens* and *Mesomelaena pseudostygia* over sparse herbland of *Haemodorum* sp*., Drosera erythrorhiza* and *Dampiera linearis*

Highly modified
Includes areas that have been predominantly cleared but which still contain either scattered natives or introduced species. These include bulldozed firebreaks that contain seed and which may support occasional native species

Banksia Woodland
Banksia attenuata and *Banksia menziesii* low woodland over A*denanthos cygnorum subsp. cygnorum* and *Eremaea pauciflora var. pauciflora* open shrubland over *Stirlingia latifolia* low open shrubland over *Mesomelaena pseudostygia* very open sedgeland.

Pl02:
Grevillea eriostachya and *Allocasuarina humilis* tall open shrubland over *Xanthorrhoea preissii* and *Eremaea pauciflora var. pauciflora* open shrubland over *Austrostipa elegantissima* and *Amphipogon turbinatus* very open tussock grassland over *Mesomelaena pseudostygia* very open sedgeland.

Pl03:
Calothamnus quadrifidus subsp. *quadrifidus*, *Allocasuarina humilis* and *Jacksonia floribunda* tall shrubland over *Eremaea pauciflora* var. *pauciflora* and *Xanthorrhoea preissii* shrubland over *Hibbertia crassifolia* low open shrubland over *Tetraria octandra*, *Mesomelaena pseudostygia* open sedgeland.

Pl04:
Eucalyptus todtiana, Banksia attenuata and *Banksia menziesii* low open woodland over *Xanthorrhoea preissii* open shrubland over *Hibbertia crassifolia, Eremaea pauciflora var. pauciflora* and *Allocasuarina humilis* low shrubland over *Mesomelaena pseudostygia* and *Tetraria octandra* very open sedgeland.

W01:
Banksia prionotes and *Melaleuca rhaphiophylla* tall shrubland over *Acacia saligna* subsp. *saligna* open shrubland over *Juncus kraussii* subsp. *australiensis* low open shrubland over **Ehrharta calycina* very open tussock grassland.

Widening 120-136 SLK

This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition. The application area is comprised of 5 vegetation types:

Tall *Adenanthos* and *Allocasuarina* Shrubland
Tall shrubland of *Adenanthos cygnorum, Allocasuarina humilis* and *Leptospermum erubescens* over mixed, low shrubland of *Jacksonia floribunda, Hibbertia hypericoides* and *Daviesia podophylla* over herbland of *Dampiera linearis, Dampiera linearis* and *Conostylis teretifolia*

Low *Calothamnus* heath
Closed shrubland of *Calothamnus* species over herbland of *Drosera* spp., *Hypochaeris* sp. and *Stylidium* sp.

Highly modified
Includes areas that have been predominantly cleared but which still contain either scattered natives or introduced species. These include bulldozed firebreaks that contain seed and which may support occasional native species

Low, mixed heath
Sparse shrubland of *Allocasuarina humilis, Leptospermum erubescens* and *Conospermum stoechadis* over sedgeland of *Ecdeiocolea monostachya* over low shrubland of *Calothamnus sanguineus, Hibbertia hypericoides and Daviesia nudiflora* over mixed sedgeland and grassland of *Neurachne alopecuroidea, Desmocladus* spp and *Mesomelaena pseudostygia, Schoenus* spp. and sparse herbland of *Trachymene pilosa, Drosera* spp. and *Poranthera microphylla*

Mixed Tall shrubland
Sparse woodland of *Banksia attenuata* over tall shrubland of *Adenanthos cygnorum, Allocasuarina humilis, Jacksonia nutans* over mixed, low shrubland of *Jacksonia floribunda, Hibbertia hypericoides* and *Eremaea asterocarpa* over sedgeland of *Alexgeorgea nitens, Lyginia barbata* and *Mesomelaena pseudostygia*

Widening 139-152 SLK

This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition. The application area is comprised of 4 vegetation types:

Cleared/ Degraded
Includes existing clearing road reserve, gravel pits, tracks and firebreaks. Often comprises Scattered Shrubs over Scattered Bunch introduced grass and Scattered Herbs.

Mixed Heath on White Sand (with Laterite)

Open Heathland of *Leucopogon oldfieldii, Conostephium sangineus*, *Hibbertia hypercoides, H. subvaginata,Leucopogon oldfieldii, Stirlingia incrassate* over Low Open Shrubland *Banksia shuttleworthiana, Hakea conchifolia, Jacksonia floribund o*ver Sedgeland of *Dasypogon bromeliifolius, Mesomelaena pseudostygia, Xanthorrhoea priessii, Desmocladus subterranea* over Scattered Herbs of *Drosea citrina, D. bulbosa* subsp. *bulbosa, Stylidium miniatum,* on White Sand with Laterite.

Low Open Banksia Woodland
Low Open Woodland of *Eucalyptus todtiana, Bankia menziesii, B. attenuata,* over Shrubland of *Hakea obliqua* over Low Open Shrubland of *Banksia shuttleworthiana, Jacksonia floribunda, Conostylis setigera* subsp. *setigera, Stirlingia latifolia, Calothamnus sanguineus, Hakea prostrata* over Open Sedgeland of *Schoenus rigens, Dasypogon bromeliifolius, Desmocladus subterranea, Lyginia barbata, Mesomelaena pseudostygia* over Very Open Herbs of *Phyllangium divergens, Burchardia congesta, Drosera citrina,Stylidium miniatum.*

Heath on Gravel
Scattered Shrubs of *Petrophile macrostachya, Allocasuarina humilis* over Low Open Heath of *Leucopogn oldfieldii, Gastrolobium polystachyum, Eremaea pauciflora, Astroloma glaucescens* over Sedgeland of *Mesomelaena tetragona* over Scattered Herbs of *Stylidium cygnorum, Drosera porrecta.*

Northbound Passing Lane 34.83-36 SLK

This application area is in degraded to completely degraded (EPA and DPaW, 2015) condition. The application area is comprised of 2 vegetation types:

Parkland cleared
Woodland of *Corymbia calophylla* over weed grassland of **Ehrharta calycina, *E. longiflora* and **Avena* spp. with occasional *Banksia prionotes, Xanthorrhoea preissii* and *Grevillea vestita,* and occasional trees of *Eucalyptus rudis* in low-lying areas

Highly modified
Includes areas that have been predominantly cleared but which still contain either scattered natives or introduced species. These include bulldozed firebreaks that contain seed and which may support occasional native species

Southbound Passing Lane 68.63-71.02 SLK

This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in very good to excellent condition. The application area is comprised of 2 vegetation types:

Banksia attenuata and *B. menziesii* woodland
Woodland of *Banksia menziesii* and *B. attenuata* over sparse tall shrubland of *Adenanthos cygnorum, Jacksonia floribunda* and *Xanthorrhoea preissii* over low shrubland of *Bossiaea eriocarpa, Eremaea pauciflora, Stirlingia latifolia* and open sedgeland of *Lyginia barbata, Alexgeorgea nitens* and *Mesomelaena pseudostygia* over sparse herbland of *Haemodorum* sp*., Drosera erythrorhiza* and *Dampiera linearis*

Highly modified
Includes areas that have been predominantly cleared but which still contain either scattered natives or introduced species. These include bulldozed firebreaks that contain seed and which may support occasional native species

Northbound Passing Lane 79.84-81.71 SLK

This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in very good condition. The application area is comprised of 3 vegetation types:

Banksia attenuata and *B. menziesii* woodland
Woodland of *Banksia menziesii* and *B. attenuata* over sparse tall shrubland of *Adenanthos cygnorum, Jacksonia floribunda* and *Xanthorrhoea preissii* over low shrubland of *Bossiaea eriocarpa, Eremaea pauciflora, Stirlingia latifolia* and open sedgeland of *Lyginia barbata, Alexgeorgea nitens* and *Mesomelaena pseudostygia* over sparse herbland of *Haemodorum* sp.*, Drosera erythrorhiza* and *Dampiera linearis*

Highly modified
Includes areas that have been predominantly cleared but which still contain either scattered natives or introduced species. These include bulldozed firebreaks that contain seed and which may support occasional native species

Tall Mixed Shrubland
Tall shrubland of *Xanthorrhoea preissii, Hakea trifurcata* and *Jacksonia sternbergiana* over shrubland of *Hibbertia hypericoides, Petrophile macrostachya* and *Calothamnus quadrifidus* subsp*. quadrifidus* and grassland of *Austrostipa elegantissima, *Ehrharta longiflora, Neurachne alopecuroides* over open herbland of *Drosera erythrorhiza, Hypochaeris glabra, *Ursinia anthemoides*

Southbound Passing Lane 111.08-112.9 SLK

This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority being in excellent to very good condition. The application area is comprised of 4 vegetation types:

Banksia attenuata and *B. menziesii* woodland over mixed shrubland and sedgeland
Woodland of B*anksia menziesii* and *B. attenuata* over sparse tall shrubland of *Allocasuarina humilis, Jacksonia sternbergiana* and *Xanthorrhoea preissii* over low shrubland of *Bossiaea eriocarpa, Hibbertia hypericoides* and *Hypocalymma xanthopetalum* over mixed grassland and sedgeland of *Mesomelaena pseudostygia, *Ehrharta spp.* and **Briza maxima*

Eucalyptus rudis – Melaleuca rhaphiophylla woodland
Eucalyptus rudis – Melaleuca rhaphiophylla woodland over weedy grasses, including **Ehrharta* spp. and **Eragrostis curvula.*

Low, mixed heath
Sparse shrubland of *Allocasuarina humilis, Leptospermum erubescens* and *Conospermum stoechadis* over sedgeland of *Ecdeiocolea monostachya* over low shrubland of *Calothamnus sanguineus, Hibbertia hypericoides and Daviesia nudiflora* over mixed sedgeland and grassland of *Neurachne alopecuroidea, Desmocladus* spp and *Mesomelaena pseudostygia, Schoenus* spp. and sparse herbland of *Trachymene pilosa, Drosera* spp. and *Poranthera microphylla*

Highly modified
Includes areas that have been predominantly cleared but which still contain either scattered natives or introduced species. These include bulldozed firebreaks that contain seed and which may support occasional native species

Northbound Passing Lane 113.6-115.94 SLK

This application area is in excellent to completely degraded condition (EPA and DPaW, 2015) condition with the majority in excellent to very good condition. The application area is comprised of 3 vegetation types:

Low, mixed heath
Sparse shrubland of *Allocasuarina humilis, Leptospermum erubescens* and *Conospermum stoechadis* over sedgeland of *Ecdeiocolea monostachya* over low shrubland of *Calothamnus sanguineus, Hibbertia hypericoides and Daviesia nudiflora* over mixed sedgeland and grassland of *Neurachne alopecuroidea, Desmocladus* spp and *Mesomelaena pseudostygia, Schoenus* spp. and sparse herbland of *Trachymene pilosa, Drosera* spp. and *Poranthera microphylla*

Highly modified
Includes areas that have been predominantly cleared but which still contain either scattered natives or introduced species. These include bulldozed firebreaks that contain seed and which may support occasional native species

Eucalyptus todtiana and *Banksia attenuata* very open woodland
Open woodland of *Banksia attenuata, B. menziesii* and *Eucalyptus todtiana* over open shrubland of *Hakea ruscifolia, Xanthorrhoea preissii* and *Allocasuarina humilis* over low shrubland of *Petrophile macrostachya, Eremaea pauciflora* and *Hakea incrassata* and grassland of **Ehrharta* spp*., *Eragrostis curvifolia* and **Bromus diandrus*

Southbound Passing Lane 126.2-128.38 SLK

This application area is in excellent to very degraded (EPA and DPaW, 2015) condition with the majority in excellent to very good condition. The application area is comprised of 5 vegetation types:

Low, mixed heath
Sparse shrubland of *Allocasuarina humilis, Leptospermum erubescens* and *Conospermum stoechadis* over sedgeland of *Ecdeiocolea monostachya* over low shrubland of *Calothamnus sanguineus, Hibbertia hypericoides and Daviesia nudiflora* over mixed sedgeland and grassland of *Neurachne alopecuroidea, Desmocladus* spp and *Mesomelaena pseudostygia, Schoenus* spp. and sparse herbland of *Trachymene pilosa, Drosera* spp. and *Poranthera microphylla*

Highly modified
Includes areas that have been predominantly cleared but which still contain either scattered natives or introduced species. These include bulldozed firebreaks that contain seed and which may support occasional native species

Tall *Adenanthos* and *Allocasuarina* Shrubland
Tall shrubland of *Adenanthos cygnorum, Allocasuarina humilis* and *Leptospermum erubescens* over mixed, low shrubland of *Jacksonia floribunda, Hibbertia hypericoides* and *Daviesia podophylla* over herbland of *Dampiera linearis, Dampiera linearis* and *Conostylis teretifolia*

Low *Calothamnus* heath
Closed shrubland of *Calothamnus* species over herbland of *Drosera* spp., *Hypochaeris* sp. and *Stylidium* sp.

Mixed Tall shrubland
Sparse woodland of *Banksia attenuata* over tall shrubland of *Adenanthos cygnorum, Allocasuarina humilis, Jacksonia nutans* over mixed, low shrubland of *Jacksonia floribunda, Hibbertia hypericoides* and *Eremaea asterocarpa* over sedgeland of *Alexgeorgea nitens, Lyginia barbata* and *Mesomelaena pseudostygia*

Northbound and southbound Passing Lane 159.8-163.6 SLK

This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in excellent condition. The application area is comprised of 5 vegetation types:

Northern Banksia woodland
Sparse woodland of *Banksia attenuata* and *B. menziesii* over shrubland of *Melaleuca seriata, M. leuropoma* and *Acacia pulchella* over mixed grassland and sedgeland of *Lyginia* spp., *Desmocladus* spp. and **Ehrharta calycina* over herbland of *Burchardia congesta, *Ursinia anthemoides* and *Conostylis aculeata* subsp. *aculeata.*

Highly modified
Includes areas that have been predominantly cleared but which still contain either scattered natives or introduced species. These include bulldozed firebreaks that contain seed and which may support occasional native species

Calothamnus shrubland and *Meeboldina* Sedgeland
Low shrubland of *Calothamnus hirsutus, Thryptomene mucronulata* and *Verticordia* spp. over mixed sedgeland of *Meeboldina coangustata, Schoenus insolitus* and *Centrolepis* spp. and herbland of *Tribonanthes australis*., *Stylidium flagellum* and *Drosera gigantea* subsp. *gigantea*

Mixed heath
Sedgeland of *Ecdeiocolea monostachya* over heathland of *Allocasuarina microstachya, Banksia* spp. and *Petrophile* spp. over herbland of *Dampiera spicigera, Pterochaeta paniculata* and *Drosera* spp.

Mixed tall shrubland
Sparse tall shrubland of *Adenanthos cygnorum* and *Hakea trifurcata* over shrubland of *Melaleuca* spp., *Hypocalymma xanthopetalum* and *Banksia* spp. and grassland of *Neurachne alopecuroidea, *Avena barbata* and **Briza maxima.*

For a full description of the existing vegetation, refer to the Biological Surveys:

- Woodman Environmental (2017) Brand Highway Passing Lanes: Survey for Listed Threatened and Priority Flora Taxa. (Awaiting final report)
- Ecologia (2017) Awaiting draft report.
- Astron (2016) Brand Highway, Regans Ford Biological Survey (D16#715905)
- GHD (2016) Brand Highway Passing Lanes Biological Assessment (D16#350127)
- GHD (2016) Brand Highway, Various Sections: SLK 74-150 Biological Survey (D16#728602)

Table 1: Summary of Project Area's Mapped Pre-European Vegetation Associations

Clearing Description	Comments
Clearing of up to 37.8 ha for road widening and passing lanes on Brand Hwy, Gingin and Dandaragan.	Vegetation description and condition determined from 2017 floristic surveys (Woodman & Ecologia) following preliminary surveys (GHD 2016 Astron 2016) Biological Surveys and aerial imagery.

77 to 79 SLK and 79 to 81 SLK

Widening 77.3-79.84 SLK=1.6ha. This application area is in excellent to degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition

Northbound Passing Lane 79.84-81.71 SLK=2.1ha This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in very good to excellent condition.

The vegetation is mapped as:

1030 described as Low woodland; Banksia attenuata & B. menziesii

1035 described as Mosaic: Medium open woodland; marri / Shrublands; dryandra heath

The following table represents the percentage of vegetation remaining in the local region:

Project Area	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DPaW reserves
IBRA Region Swan Coastal Plain	1,501,221.93	579,161.92	38.58	37.49
Veg Assoc No. 1030	139,012.86	88,997.10	64.02	17.98
Veg Assoc No. 1030 in the IRBA Swan Coastal Plain region	134,788.56	86,061.30	63.85	16.11
Statewide Veg Assoc No. 1035	5,018.34	494.12	9.85	53.65
Veg Assoc No. 1035 in the IRBA Swan Coastal Plain region	3,435.37	360.96	10.51	70.73
Local Government Authority Shire of Dandaragan	671,022.05	296,631.55	44.21	42.37

81 to 86 SLK and 113 to 115 SLK

Widening 81.71-86 SLK=2.6ha. This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition.

Northbound Passing Lane 113.6-115.94 SLK=2.2ha. This application area is in excellent to completely degraded condition (EPA and DPaW, 2015) condition with the majority in excellent to very good condition.

The vegetation is mapped as:

1030 described as Low woodland; Banksia attenuata & B. menziesii

1031 described as Mosaic: Shrublands; hakea scrub-heath / Shrublands; dryandra heath

The following table represents the percentage of vegetation remaining in the local region:

Project Area	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DPaW reserves
IBRA Region Swan Coastal Plain	1,501,221.93	579,161.92	38.58	37.49
Statewide Veg Assoc No. 1030	139,012.86	88,997.10	64.02	17.98
Veg Assoc No. 1030 in the IRBA Swan Coastal Plain region	134,788.56	86,061.30	63.85	16.11
Statewide Veg Assoc No. 1031	269,490.91	88,606.02	32.88	42.30
Veg Assoc No. 1031 in the IRBA Swan Coastal Plain region	27,729.97	5,352.64	19.30	14.56
Local Government Authority Shire of Dandaragan	671,022.05	296,631.55	44.21	42.37

111 to 112 SLK

Southbound Passing Lane 111.08-112.9 SLK=2.2ha. This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority being in excellent to very good condition.

The vegetation is mapped as:

1030 described as Low woodland; Banksia attenuata & B. menziesii

The following table represents the percentage of vegetation remaining in the local region:

Project Area	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DPaW reserves
IBRA Region Swan Coastal Plain	1,501,221.93	579,161.92	38.58	37.49
Statewide Veg Assoc No. 1030	139,012.86	88,997.10	64.02	17.98
Veg Assoc No. 1030 in the IRBA Swan Coastal Plain region	134,788.56	86,061.30	63.85	16.11
Local Government Authority Shire of Dandaragan	671,022.05	296,631.55	44.21	42.37

126 to 128 SLK, 139 to 152 SLK and 159 to 163 SLK

Southbound Passing Lane 126.2-128.38 SLK=2.5ha. This application area is in excellent to very degraded (EPA and DPaW, 2015) condition with the majority in excellent to very good condition.

Widening 139-152 SLK=4.6ha. This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition.

Northbound and southbound Passing Lane 159.8-163.6 SLK=6ha. This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in excellent condition.

The vegetation is mapped as:

1031 described as Mosaic: Shrublands; hakea scrub-heath / Shrublands; dryandra heath

The following table represents the percentage of vegetation remaining in the local region:

Project Area	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DPaW reserves
IBRA Region Geraldton Sandplains This row is obtained from the report sheet 2a	3,136,037.83	1,404,373.33	44.78	40.33
Statewide Veg Assoc No.1031 This row is obtained from the report sheet 2a	269,490.91	88,606.02	32.88	42.30
Veg Assoc No.1031 in the IRBA Geraldton Sandplains region This row is obtained from the report sheet 2a	241,349.97	83,154.99	34.45	44.13
Local Government Authority Shire of Dandaragan	671,022.05	296,631.55	44.21	42.37

120 to 136 SLK

Widening 120-136 SLK=6ha. This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition.

The vegetation is mapped as:

7 described as Medium woodland; York gum (Eucalyptus loxophleba) & wandoo

1030 described as Low woodland; Banksia attenuata & B. menziesii
1031 described as Mosaic: Shrublands; hakea scrub-heath / Shrublands; dryandra heath

The following table represents the percentage of vegetation remaining in the local region:

Project Area	**Pre–European (ha)**	**Current Extent (ha)**	**% Remaining**	**% Remaining in DPaW reserves**
IBRA Region Geraldton Sandplains This row is obtained from the report sheet 2a	3,136,037.83	1,404,373.33	44.78	40.33
Statewide Veg Assoc No.7 This row is obtained from the report sheet 2a	179,724.65	23,104.48	12.86	5.26
Veg Assoc No.7 in the IRBA Geraldton Sandplains region This row is obtained from the report sheet 2a	4,136.50	1,391.05	33.63	9.20
Statewide Veg Assoc No.1030 This row is obtained from the report sheet 2a	139,012.86	88,997.10	64.02	17.98
Veg Assoc No.1030 in the IRBA Geraldton Sandplains region This row is obtained from the report sheet 2a	3,848.52	2,790.59	72.51	74.80
Statewide Veg Assoc No.1031 This row is obtained from the report sheet 2a	269,490.91	88,606.02	32.88	42.30
Veg Assoc No.1031 in the IRBA Geraldton Sandplains region This row is obtained from the report sheet 2a	241,349.97	83,154.99	34.45	44.13
Local Government Authority Shire of Dandaragan	671,022.05	296,631.55	44.21	42.37

(Government of Western Australia, 2014)

34-36 SLK

Northbound Passing Lane 34.83-36 SLK=1.3ha. This application area is in degraded to completely degraded (EPA and DPaW, 2015) condition

This vegetation is mapped as:

Gingin Complex-Open woodland of Corymbia calophylla (Marri) with second storey of Banksia grandis (Bull Banksia) and Nuytsia floribunda. Fringing woodland of Eucalyptus rudis (Flooded Gum) - Melaleuca rhaphiophylla.

The following table represents the percentage of vegetation remaining in the local region:

Heddle/Mattiske Veg Complex	Pre-European Extent (ha)	2013 Vegetation Extent	% Remaining
Gingin Complex	7,113.48	823.92	11.58

65 to 68 SLK and 71 to 74 SLK

Widening 65-68.63 SLK =2.2ha. This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in very good condition.
Widening 71.02-74 SLK=1.8ha. This application area is in excellent to degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition
This vegetation is mapped as:
Coonambidgee Complex-Vegetation ranges from a low open forest and low woodland of Eucalyptus todtiana (Pricklybark) - Banksia attenuata (Slender Banksia) - Banksia menziesii (Firewood Banksia) - Banksia ilicifolia (Holly-leaved Banksia) with localised admixtures of Banksia prionotes (Acorn Banksia) to an open woodland of Corymbia calophylla (Marri) - Banksia species.
Bassendean Complex- Vegetation ranges from a low open forest and low open woodland of Banksia species Eucalyptus todtiana (Pricklybark) to low woodland of Melaleuca species and sedgelands which occupy the moister sites.

The following table represents the percentage of vegetation remaining in the local region:

Heddle/Mattiske Veg Complex	Pre-European Extent (ha)	2013 Vegetation Extent	% Remaining
Coonambidgee Complex	6,272.47	2,854.98	45.52
Bassendean Complex-North	79,057.33	56,600.05	71.59

68 to 71 SLK

Southbound Passing Lane 68.63-71.02 SLK=2.7ha This application area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in excellent condition.
This vegetation is mapped as:
Coonambidgee Complex-Vegetation ranges from a low open forest and low woodland of Eucalyptus todtiana (Pricklybark) - Banksia attenuata (Slender Banksia) - Banksia menziesii (Firewood Banksia) - Banksia ilicifolia (Holly-leaved Banksia) with localised admixtures of Banksia prionotes (Acorn Banksia) to an open woodland of Corymbia calophylla (Marri) - Banksia species.

The following table represents the percentage of vegetation remaining in the local region:

Heddle/Mattiske Veg Complex	Pre-European Extent (ha)	2013 Vegetation Extent	% Remaining
Coonambidgee Complex	6,272.47	2,854.98	45.52

(Heddle, Loneragan and Havel, 1980)

5.3 Assessment against the Ten 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 is:

- At variance to Principles (b), (d), (e) and (f)
- Maybe at variance to Principle (a)
- Not likely to be at variance to the remaining Principles

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

Comments

Proposed clearing may be at variance to this Principle

This project involves the linear clearing across 14 project areas that comprise the application area. The application areas are generally in more degraded condition that the contiguous tracts of remnant vegetation outside of the application areas. Although the proposed clearing areas contain good quality vegetation and include records of Priority flora and fauna foraging habitat, the values are not greater than immediately adjacent areas.
The vegetation condition, vegetation associations and vegetation type are discussed in Section 5.2.1.

Within the study area there are known records of 37 declared rare flora (DRF) and 165 priority flora. Following targeted surveys, the following species occur within the application area:

Species	Status	Individuals within application area to be removed	Locations recorded within survey area	No. of individuals recorded in Survey Area	Status and Relevant Data outside the Survey Area
Lyginia excelsa	P1	625	83	625	Extends outside survey area: 1,038 individuals recorded across 73 point locations
Arnocrinum gracillimum	P2	1	1	1	Extends outside survey area: 47 individuals recorded across 5 point locations
Catacolea enodis	P2	5	4	5	Extends outside survey area: 3 individuals recorded at 1 point location
Comesperma rhadinocarpum	P2	142	71	144	Extends outside survey area: 5 individuals recorded at 1 point location, most individuals restricted to gravel shoulder of highway
Desmocladus microcarpus	P2	1	1	1	Extends outside survey area: 1 individual observed at previously recorded location (GHD 2016a).
Persoonia filiformis	P2	6	4	6	Not observed outside survey area
Beaufortia bicolor	P3	444	126	457	Extends outside survey area: 145 individuals recorded across 44 point locations
Desmocladus biformis	P3	89	21	89	Extends outside survey area: 13 individuals recorded across 5 point locations
Guichenotia alba	P3	28	8	31	Extends outside survey area: 56 individuals recorded across 3 point locations, plus approximately 19 further individuals recorded by GHD (2016b)
Haemodorum loratum	P3	8	6	9	Extends outside survey area: not recorded outside survey area by this survey, however 2 individuals occur outside survey area at 2 locations recorded by Astron (2016)
Hensmania stoniella	P3	4	3	4	Not observed outside survey area

Hypocalymma serrulatum	P3	1294	87	1298	Extends outside survey area: 511 individuals recorded across 6 point locations
Jacksonia anthoclada	P3	59	8	59	Not observed outside survey area
Phlebocarya pilosissima subsp. *pilosissima*	P3	10	11	11	Extends outside survey area: not recorded outside survey area by this survey, however 2 individuals occur outside survey area at 2 locations recorded by GHD (2016b)
Stylidium hymenocraspedum	P3	0	5		It is possible the previously recorded individuals have senesced. Stylidium hymenocraspedum was observed outside the survey area in nearby areas during the survey.
Tetratheca angulata	P3	89	13	89	Extends outside survey area: 25 individuals recorded at 1 point location, plus 2 individuals across locations recorded by GHD (2016a)
Anigozanthos humilis subsp. *chrysanthus*	P4	1	1	1	Not observed outside survey area
Conostephium magnum	P4	224	77	225	Extends outside survey area: 111 individuals recorded across 19 point locations, plus numerous further individuals across locations recorded by GHD (2016a, b)
Desmocladus elongatus	P4	240	21	241	Extends outside survey area: 5 individuals recorded at 1 point location, plus several individuals at locations recorded by GHD (2016a, b), most individuals restricted to historically disturbed verge of highway
Grevillea rudis	P4	27	7	27	Extends outside survey area: 2 individuals recorded at 1 point location, plus approximately 21 individuals at locations recorded by GHD (2016a, b)
Grevillea saccata	P4	13	7	13	Extends outside survey area: not recorded outside survey area by this survey, however approximately 22 individuals occur outside survey area across locations recorded by GHD (2016b)
Hypolaena robusta	P4	82	17	82	Extends outside survey area: 41 individuals recorded across 5 point locations
Schoenus griffinianus	P4	39	12	40	Extends outside survey area: 5 individuals recorded across 2 point locations, plus approximately 3 individuals across locations recorded by GHD (2016a)

As evident from the table above the majority of the species that are to be impacted by the project activities are relatively widespread and known from a number of populations. These species are found in the greater surrounding area as the vegetation in the surrounding landscape is similar in type and in the same or better condition as the application area. Four species, *Lyginia excelsa* (P1), *Catacolea enodis* (P2), *Desmocladus microcarpus* (P2), and *Tetratheca angulata* (P3), are considered to be of higher significance as they have a restricted range or are known from relatively few populations. However, all of these taxa were recorded outside the application area, and it is expected that there are additional locations of these taxa in the immediate vicinity of the application area. The species are found both locally and regionally and the potential impacts from clearing are not likely to adversely impact the conservation status of any of the species.

GHD identified four locations of *Grevillea makinsonii* however it has been confirmed by the Western Australia Herbarium that these individuals are actually *Grevillea shuttleworthiana* and were incorrectly identified originally. GHD also identified *Hypolaena robusta* though Woodman have identified that some of these records are *Lyginia excels* instead. Other individuals that were incorrectly identified include *Hypocalymma xanthopetalum* which was recorded previously as *Hypocalymma gardneri* and *Diuris tinkeri which was recorded as Diuris ?recurva*. It was identified that *Banksia dallanneyi* subsp. *pollosta* also does not

	occur within the survey area. The Threatened taxon *Drakaea elastica* is considered unlikely to occur in the application area. Although there is a record in relatively close (<2 km) proximity, the record is adjacent to Red Gully Creek; this is considered typical habitat for this species, which occurs in low-lying sandy sites adjacent to wetlands. No such habitat exists in the application area; the habitat is *Banksia attenuata-Banksia menziesii* woodland, however it is not low-lying, and the application area does not intersect any wetlands near this location. It is therefore considered unlikely that this taxon occurs in the application area. Woodman Consultancy was contracted specifically for the additional survey as their botanists are the most experience in the State with surveying for this species and are intimately familiar with its habitat. Within the study area there are records of 38 known protected fauna species. Of these species only Carnaby's Black Cockatoo will be impacted. As there is a large amount of vegetation remaining in the areas including in nearby reserves and that vegetation will remain in the road corridor it is unlikely that any linkages or corridors will be impacted. Therefore this project is unlikely to have significant impacts on any other fauna species or fauna habitat. Within the study area there are known records of 6 Threatened Ecological Communities (TECs) and 3 Priority Ecological Communities. These are: • Perth to Gingin Ironstone Association-Critically Endangered • Banksia attenuata woodlands over species rich dense shrublands-Endangered • Melaleuca huegelii - Melaleuca acerosa (currently M. systena) shrublands on limestone ridges-Endangered • Shrublands and woodlands on Muchea Limestone-Endangered • Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain-Vulnerable • Herb rich saline shrublands in clay pans-Vulnerable • Banksia woodland of the Gingin area restricted to soils dominated by yellow to orange sands-P2 • Swan Coastal Plain Banksia attenuata - Banksia menziesii woodlands-P3 • Banksia ilicifolia woodlands-P3 It was identified from the biological surveys that the only TEC or PEC with the potential to occur in the application area is the Commonwealth listed "Banksia Woodlands of the Swan Coastal Pain". This project involves the removal of up to 15.24ha of vegetation that represents this TEC. Given the narrow linear strips of vegetation alongside an existing highway with adjacent vegetation in similar or better condition, the proposed clearing may be at variance to this Principle. Given the priority flora impacts are not significant in a local or population context, Main Roads will be requesting an exemption from providing an offset for priority flora.
Methodology	DPAW shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016) Woodman Environmental Targeted Flora (2017) Ecologia Ecological Community Mapping (2017) 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 is at variance to this Principle
	Within the study area there are known records of 38 protected fauna species. During the surveys the following conservation status species were identified: • *Calyptorhynchus latirostris* (Carnaby's Black Cockatoo)-Endangered The following species were determined to have a high likelihood of occurring in the application area: • *Dasyurus geoffroii* (Chuditch)-Vulnerable • *Falco peregrinus* (Peregrine Falcon) • *Ardea modesta* (Eastern Great Egret)-Migratory • *Plegadis falcinellus* (Glossy Ibis)-Migratory • *Tringa nebularia* (Common Greenshank)-Migratory • *Tringa glareola* (Wood Sandpiper)-Migratory • *Calidris ruficollis* (Red-necked Stint)-Migratory • *Philomachus pugnax* (Ruff)-Migratory • *Asphidites ramsayi* (Woma)-Specially protected • *Morelia spilota* subsp. *imbricata* (Carpet Python)- Specially protected • *Neelaps calonotos* (Black-striped Snake)-P3 • *Macropus irma* (Western Brush Wallaby)-P4 Of these species the only one likely to be present within the application area and impacted by this project is the Carnaby's Black Cockatoo. The impact is limited to a minor loss of foraging habitat associated with small linear strip of vegetation removed adjacent to an existing highway. The application areas contains potential habitat for the Chuditch. However the rate of occupancy within the application area is likely to be low given the fragmentation of the habitat by the highway and the agricultural land in the area. The Chuditch is more likely to inhabit the better suited habitats of Moore River National Park, Namming and Boonanarring Nature Reserves in the surrounding area. The application area does not represent significant habitat for this mobile species and it is unlikely that this species will be impacted by the project activities. The proposed clearing does not sever any linkages which the Chuditch may use for dispersal. The Western Brush Wallaby could utilise the sites occasionally for refuge or may use the road verge vegetation as linear passage between habitat resources. However as the project involves removing small linear sections of vegetation adjacent to the road and that there will be vegetation remaining in the road reserve it is unlikely that this species will be impacted as these habitat linkages will remain. Carnaby's cockatoo inhabits Eucalypt woodlands and forages on proteaceous species. During the surveys Carnaby's cockatoo were sighted and foraging evidence was found at numerous locations. The application areas all contain foraging habitat suitable for Carnaby's Black Cockatoo as outlined following:

Project type	SLK range	Shire	Application area (ha)	Clearing Area (ha)
Widening	65-68.63	Gingin	5.13	2.2
	71.02-74		3.98	1.8
	77.3-79.84	Dandaragan	3.27	1.6
	81.71-86		3.8	2.6
	120-136		10.3	6
	139-152		9.95	4.6
Northbound Passing Lane	34.83-36	Gingin	0.96	0.96
Southbound Passing Lane	68.63-71.02		4.9	2.7
Northbound Passing Lane	79.84-81.1	Dandaragan	4	2.1
Southbound Passing Lane	111.08-112.9		3.7	2.2
Northbound Passing Lane	113.6-115.94		2.9	2.2
Northbound Passing Lane	159.8-163.6		5.33	5.33
Southbound Passing Lane	160.1-163.4			
TOTAL			58.22	**34.29**

Within the survey area there is 544.4 ha of foraging habitat identified. Up to 34.29 ha of this will be removed along the 56 km for this project. Therefore this project will involve the removal of 6.3% of the foraging habitat in the immediate area.

Within the survey there are 204 potential breeding trees with DBH greater than 300/500mm recorded. Of these only 4 have hollows of a large enough size to be utilised, though none show evidence of current use. The project requires the removal of 51 of these potential breeding trees, none of which contain hollows.

- Northbound Passing Lane 34.83-36 SLK= 50 potential breeding trees within the application area
- Widening 120-136 SLK= 1 potential breeding tree within the application area

The surrounding area has similar vegetation and habitat values to the application area. The removal of a linear section of vegetation from the edge of a larger area of similar vegetation reduces the significance of the vegetation to be removed. However during the surveys Carnaby's Cockatoo were identified and foraging evidence found so this habitat is being currently utilised by this species. Within the surrounding area there are historic breeding sites in the surrounding area including Gingin, Bindoon, Mooliabeenee, Badgingarra and the Boonanaring Nature Reserve. Therefore this habitat is significant as Black Cockatoos require appropriate foraging habitat near breeding sites.

It is unlikely that the application area represents significant habitat for any other species as the project involves the removal of small linear sections of vegetation along a previously disturbed road corridor. There are large amounts of intact vegetation remaining in the area, including large conservation areas, that will act as a corridor for fauna and no linkages are likely to be broken by the project activities.

Given the removal of up to 34.29 ha of foraging habitat and up to 51 potential breeding trees that will be required for the works the proposed clearing is at variance to this Principle.

Methodology	DPAW Shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016)

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

Comments	Proposal is not likely to be at variance to this Principle
	Within the study area there are known records of 37 declared rare flora (DRF). However no DRF were identified within the survey area during any of the biological surveys; further no suitable habitat was noted during traverses of the clearing areas. Given that no DRF were identified during the biological surveys and that the application areas border the currently disturbed road corridor it is unlikely that any DRF will be impacted by the project activities. Therefore this project is not likely to be at variance to this Principle.
Methodology	DPAW shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016) Woodman Environmental (2017)

(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 at variance to this Principle
	Within the study area there are known records of six Threatened Ecological Communities (TECs). These are: • Banksia attenuata woodlands over species rich dense shrublands • Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain • Herb rich saline shrublands in clay pans • Melaleuca huegelii - Melaleuca acerosa (currently M. systena) shrublands on limestone ridges • Perth to Gingin Ironstone Association • Shrublands and woodlands on Muchea Limestone Within the GHD and Astron biological surveys it was identified that none of these TECs are present within the application area The only TEC that was identified within the application area is the Commonwealth listed "Banksia Woodlands of the Swan Coastal Plains". The application areas 120-136, 139-152 and 159-163 SLK do not occur within the Swan Coastal Plain or Jarrah Forest IBRA region and as such no vegetation within those application areas will be considered part of this TEC. Application area 34.83-36 SLK is not a Banksia Woodland and as such is unlikely to represent this TEC. Vegetation types were identified in the surveys that represent the correct structure and composition to be considered this TEC. The amounts of these in each application area are outlined below:

Project Location	TEC in application area (2016) (ha)	Max amount TEC to be cleared (2016)	2017 Resurveyed outcome
Widening 65-68.63 SLK	5.30	2.2ha	There is 55.84ha of this TEC within the application area. Of this area a maximum of 15.24ha will be removed for the project activities.
Widening 71.02-74 SLK	3.33	1.8ha	
Widening 77.3-79.84 SLK	3.13	1.6ha	
Widening 81.71-86 SLK	2.95	2.6ha	
Southbound Passing Lane 68.63-71.02 SLK	4.90	2.7ha	
Northbound Passing Lane 79.84-81.71 SLK	3.86	2.1ha	
Southbound Passing Lane 111.08-112.9 SLK	3.67	2.2ha	
Northbound Passing Lane 113.6-115.94 SLK			

	Across the application areas that represent the Banksia Woodlands of the Swan Coastal Plains TEC there is a total of 15.24ha that may be removed as part of this project. Within the survey areas there is a total of 352.07ha of vegetation that represents this TEC, which means that approximately 4.32% of the TEC in the local area will be removed. The TEC that is to be removed occurs on the edge of larger remnants of this TEC that are in similar or better condition than the vegetation to be removed. It is unlikely that this project will create any fragmentation or break any linkages of this TEC as only the edges of pre-existing remnants near the already disturbed road corridor will be removed. Given the large amount of this TEC that will remain in the road reserve and surrounding reserves it is unlikely that the small linear section of vegetation to be removed will significantly impact the Banksia Woodlands of the Swan Coastal Plain TEC. Given the removal of up to 15.24ha of vegetation that represents the "Banksia Woodlands of the Swan Coastal Pain" this project is at variance to this Principle.
Methodology	DPAW shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016) Ecologia (2017)

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

Comments	**Proposed clearing is at variance to this Principle**
	The condition, mapped vegetation associations and tables representing the percentage of vegetation remaining in the local region can be found in Section 4.2. From those tables it is clear that some application areas do not represent an area that has been extensively cleared as there is greater than the critical 30% threshold vegetation remaining in the IBRA region: • 65-68 SLK and 71-74 SLK (45.52 and 71.59% vegetation remaining in the IBRA region) • 68-71 SLK (45.52% vegetation remaining in the IBRA region) • 111-112 SLK (63.85% vegetation remaining in the IBRA region) • 120-136 SLK (33.63, 72.51 and 34.45% vegetation remaining in the IBRA region) • 126 to 128 SLK, 139 to 152 SLK and 159 to 163 SLK (34.45% vegetation remaining in the IBRA region) However the following application areas do represent an area that has been extensively cleared as less than the critical 30% threshold vegetation is remaining in the IBRA region: • 34-36 SLK (11.58% vegetation remaining in the IBRA region-Vegetation Association Gingin Complex) • 77-79 SLK and 79-81 SLK (10.51% vegetation remaining in the IBRA region-Vegetation Association 1035) • 81-86 SLK and 113-115 SLK (19.30% vegetation remaining in the IBRA region-Vegetation Association 1031). It is considered that the clearing of any native vegetation, given its poor representation, may be considered significant as a remnant of native vegetation. Therefore the sections of the application areas that are mapped as Vegetation Associations 1035, 1031 and Gingin Complex may be significant as a remnant. Within the area surrounding 34-36 SLK there is approximately 20% vegetation remaining. The largest remnant of the native vegetation is concentrated 5.8km to the north east of the application area. The native vegetation to be cleared ranges from degraded to completely degraded (EPA and DPaW, 2015) condition. Native vegetaiton will still remain in the surrounding area but only in small fragments as the surrounding area is predominately pastoral. The highly cleared nature of the surrounding area makes the vegetation to be removed significant. This section of the project requires up to 1.3ha of vegetation to be removed from a 3.7ha application area.

	Within the area surrounding 77-79 SLK, 79-81 SLK and 81-86 SLK there is approximately 40% vegetation remaining. The largest remnant of the native vegetation is concentrated to the west of the application area. The native vegetation in 77-79 SLK ranges from excellent to degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition. The 79-81 SLK ranges from excellent to completely degraded with the majority in very good to excellent. The 81-86 SLK ranges from excellent to completely degraded condition with the majority in completely degraded condition. Native vegetation will still remain in the surrounding area particularly in the reserve to the west of the application area and vegetation will remain within the road reserve allowing for corridors to remain intact and without fragmenting the landscape. This section of the project requires up to 6.3ha of vegetation to be removed from a 27.46ha project envelope and it is unlikely to be significant as a remnant due to the vegetation in the surrounding area and remaining in the road reserve. Within the area surrounding 113-115 SLK there is approximately 60% vegetation remaining. The largest remnant of the native vegetation is concentrated to the north of the application area. The native vegetation in 113-115 SLK ranges from excellent to completely degraded condition (EPA and DPaW, 2015) condition with the majority in excellent to very good condition. Native vegetation will still remain in the surrounding area particularly to the north of the application area and vegetation will remain within the road reserve allowing for corridors to remain intact and without fragmenting the landscape. This section of the project requires up to 2.2ha of vegetation to be removed from a 6.5ha project envelope and it is unlikely to be significant as a remnant due to the vegetation in the surrounding area and remaining in the road reserve. Given the low representation of Vegetation Association 1031, 1035 and Gingin Complex remaining in the IBRA region the clearing to be completed is considered significant. Therefore this project clearing is at variance to this Principle due to the removal of up to 1.3 ha of vegetation that is significant as a remnant in a highly cleared landscape. Due to the small area of clearing and low residual impact, Main Roads will be requesting an exemption from providing an offset for this Principle.
Methodology	EPA and DPaW (2015) Ecologia (2017) Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016) Government of Western Australia (2015) Heddle, Loneragan and Havel (1980) Aerial photography

(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**
	Within the study area there are numerous major and minor non perennial watercourses mapped. The nearest watercourse is a minor non-perennial that intersects the project at 143.26 and 144.23 SLK. There are also several wetlands mapped within the study area. The nearest wetlands intersect 34-36 SLK, 71.02-74 SLK and 77.3-79.84 SLK application areas. Vegetation mapping undertaken during the biological surveys identified that the 34-36 SLK occurs on parkland cleared, 71-74 SLK application areas are Banksia woodlands and 139-152 SLK contains Mixed heath on white sand, therefore these areas do not include any riparian vegetation. Vegetation mapping indicates that there is 0.27ha of riparian vegetation associated with a wetland within the project envelope of 77.3-79.84 SLK application area. Given the projects mapped vegetation types and that 0.27ha of riparian vegetation was

	identified it is considered that the native vegetation proposed to be cleared is growing in or in association with a watercourse or wetland. Therefore this project is considered to be at variance to this Principle. Given the small amount of clearing of vegetation growing in association with a wetland or riparian area, along an existing road, there is low potential for significant residual impacts; Main Roads will be requesting an exemption from providing an offset.
Methodology	DoW and DPAW shapefiles Ecologia (2017) Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016)

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

Comments	**Proposed clearing is not likely to be at variance to this Principle**

Risk	Flood	Salinity	Water Erosion	Waterlogging	Wind Erosion
34-36	<3% and 3-10%	<3%	<3% and 3-10%	<3% and >70%	>70%
65-68	<3% and 10-30%	<3%	<3% and 3-10%	<3%, 3-10% and 10-30%	>70%
68-71	10-30%	<3%	3-10%	10-30%	>70%
71-74	<3%	<3% and 30-50%	<3% and 3-10%	<3%, 10-30% and >70%	>70%
77-79	<3% and 10-30%	<3%	<3% and 10-30%	<3% and 10-30%	30-50% and >70%
79-81	>70%	<3%	<3%	<3%	<3%
81-86	<3%	<3%	<3%	<3%, 10-30% and 50-70%	30-50% and >70%
111-112	<3%	<3%	<3%	<3% and 10-30%	>70%
113-115	<3% and 10-30%	<3% and 3-10%	<3% and 3-10%	10-30%	10-30% and >70%
120-136	<3% and 10-30%	<3% and 3-10%	<3%, 3-10% and 10-30%	<3% and 3-10%	50-70% and >70%
139-152	<3%	<3%	<3% and 10-30%	<3%	30-50% and >70%
159-163	<3% and 10-30%	<3% and 3-10%	<3%, 3-10% and 10-30%	<3% and 10-30%	10-30%, 30-50% and >70%

From the table above it is clear that the majority of the degradation risks in the area are low except for wind erosion. However as there will be vegetation remaining in the surrounding area and only a linear section will be removed wind erosion is unlikely to be significantly increased.

The application area is predominately composed of sand with small areas ranging from sandy and loamy earths to clay it is unlikely that land degradation will be an issue. Since the soil is sand it will have a high infiltration rate. This will mean the risk of waterlogging or water erosion will be low. As there will be vegetation remaining in the surrounding area and only a linear section will be removed wind erosion is unlikely to be significantly increased. The works that are to be completed for this project are minor in nature. There will be no dewatering or excavation below the water table so it is unlikely that acid sulphate soils will be an issue in the area.

Given the above this proposed clearing is not likely to be at variance to this Principle.

Methodology	Natural Resource Management SLIP Shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016)

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

Comments	**Proposed clearing is not likely to be at variance to this Principle**
	Within the study area there are conservation areas. The closest to the application area are: • Badgingarra National Park located 60 m to the west and east of the application area. • Moore River National Park located adjacent to the application area. • Un-named reserve located 80 m to the west of the application area. The project activities will be confined to the road reserve so it is unlikely that this project will directly impact upon any conservation areas or reserves. Management measures will be put in place to minimise any potential indirect impacts to conservation areas and strict weed and dieback hygiene measures will be in place to ensure risk to conservation estate is minimise. Weed management will be undertaken post construction as part of the regional weed management program.
Methodology	DBCA 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**
	Within the study area there are numerous major and minor non perennial watercourses mapped. The nearest watercourse is a minor non-perennial that intersects the 139-152 SLK application area. There are also several wetlands mapped within the study area. The nearest wetlands intersect 34-36 SLK, 71.02-74 SLK and 77.3-79.84 SLK application areas. The application area falls within the Moore River and certain Tributaries and the Hill River and Tributaries Catchment Proclaimed Surface Water Area. It also lies within the Gingin and Jurien Groundwater Area. The application area does not occur within any Public Drinking Water Source Areas. As no surface water will be taken for this project and due to the minor nature of the works it is unlikely that there will be a significant impact to the water quality of this area. Given the small scale of clearing and that no dewatering or drainage modifications are required, it is considered that there will be very little to no deterioration of underground water quality. Given the above this project is not likely to be at variance to this Principle.
Methodology	DWER and DBCA shapefiles

(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**

Location	71-74 81-86 111-112 139-152	34-36	65-68 77-79 113-115 120-136 159-163	68-71	79-81
Risk	<3%	<3% and 3-10%	<3% and 10-30%	10-30%	>70%

As shown in the table above there is a low risk of flooding in the majority of the application

	area except one section which has a high risk of flooding. The application area is predominately composed of sand with small areas ranging from sandy and loamy earths to clay. Since the soil is sand it will have a high infiltration rate. This will mean the risk of flooding will be low. As there will be vegetation remaining in the surrounding area and only a linear section will be removed it is unlikely that this project will increase the risk of flooding in the area. Given the above this project is not likely to be at variance to this Principle.
Methodology	Natural Resource Management SLIP Shapefiles

6 SUMMARY OF BIOLOGICAL SURVEYS

There were three biological surveys, a targeted flora and threatened ecological community mapping survey conducted for this works package. The executive summaries of these surveys are outlined below.

Astron (2016) Brand Highway, Regans Ford Biological Survey.

Executive Summary

Astron was engaged to undertake a biological survey for the proposed road formation and seal widening of the Brand Highway in the vicinity of Regans Ford. The survey area is 109.2 ha and consists of three sections:

- SLK 65.1 to 66.57 (8.8 ha)
- SLK 71.4 to 74.18 (49.1 ha)
- SLK 82.11 to 86.0 (51.2 ha).

The 65.1 to 66.57 SLK section of the survey area occurs along the eastern boundary of the Moore River National Park. The survey area partially overlaps three 'resource enhancement' wetlands. A further wetland, not assessed as part of the geomorphic wetlands of the Swan Coastal Plain, is located at the northern end of the survey area. Two of the wetlands were inundated at the time of the survey.

The survey area includes 91 ha of native vegetation and 18.2 ha of cleared vegetation. More than half the survey area is in 'excellent' condition. In general, weed proliferation was immediately adjacent to cleared tracks, roads and agricultural areas, with little incursion into remnant vegetation.

Two vegetation types have affinity with the State-listed priority ecological community 'Swan Coastal Plain *Banksia attenuata – Banksia menziesii* woodlands'. This vegetation is also likely to represent the recently listed *Environment Protection and Biodiversity Conservation Act 1999* Endangered threatened ecological community 'Banksia Woodlands of the Swan Coastal Plain'. These vegetation types represent 70.1 ha (64%) of the survey area, and are located in each of the three sections of survey area.

No Threatened flora was recorded within the survey area. *Haemodorum loratum* P3 was recorded from two locations. Forty-five weed species were recorded, none of which are listed as a weed of national significance or listed as declared pest plants in Western Australian under the *Biosecurity and Agriculture Management Act 2007*.

The survey area contains 80 ha of foraging habitat for Carnaby's black-cockatoos, and 21 flora species that are known foraging resources. In addition, the survey area contains 7.8 ha of breeding habitat including five *Corymbia calophylla* trees that have a diameter at breast height over 50 cm, classified as mature trees and potential roost sites according the referral guidelines. Four of these mature trees contain suitable nest hollows for breeding, however, none of the trees or hollows showed signs of current or historic breeding/roosting.

Regans Ford is a known breeding site for Carnaby's black-cockatoos and breeding and roosting sites have been recorded in the native vegetation surrounding the survey area, the closest sites occurring within 1 km. The survey recorded one conservation significant species, the Carnaby's black-cockatoo. In addition a further eight conservation significant species have been classified as having a 'high' likelihood of occurring in the survey area; eastern great egret, glossy ibis, common greenshank, wood sandpiper, red-necked stint, ruff, rainbow bee-eater and western quoll.

Although seven migratory shorebirds and waders are considered to have a high likelihood of occurrence in the survey area, the Ephemeral Wetlands habitat is considered marginal compared with larger and better suited habitats found at nearby lakes, including at Beermullah Lake, Doopiter Swamp, Matilda Lake and Karakin Lake. As such, the conservation significant fauna recorded or considered likely to occur in the survey area are unlikely to be reliant upon the habitats present.

Two Matters of National Environmental Significance occur in the survey area and are likely to require Commonwealth referral. The 'Banksia Woodlands of the Swan Coastal Plain' threatened ecological community meets key diagnostic characteristics, has a condition of 'good' or greater, and is greater than the minimum patch size threshold. Greater than the 1 ha threshold of quality foraging habitat for Carnaby's black-cockatoos occurs and as such the proposed clearing may result in a 'high risk of significant impact'.

GHD (2016) Brand Highway Passing Lanes Biological Assessment.

Executive summary

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.5 and the assumptions and qualifications contained throughout the Report.

Main Roads Western Australia is proposing to construct eight passing lanes on the Brand Highway between Gingin and Eneabba in Western Australia. The passing lanes are located at:

- SLK 71.0-68.7 southbound (Site 1)
- SLK 79.7-81.5 northbound (Site 2)
- SLK 112.8-110.4 southbound (Site 3)
- SLK 113.6 – 116.3 northbound (Site 4
- SLK 126.2 – 129.0 southbound (Site 5)
- SLK 160.3 – 163.9 northbound (Site 6)
- SLK 160.0 – 162.0 southbound (Site 7)
- SLK 34.83-36.0 northbound (Site 8).

The Survey area included a larger area than is likely to be required for the passing lanes; however, the survey was focused on the area adjacent to the highway that will be directly impacted by the Project.

A desktop assessment and a flora and fauna field assessment was undertaken 15-19 September 2014 and the 7-13 September 2015, with additional survey effort for Site 8 on 30 March 2014 and 23 January 2016.The assessment identified the following biological features of the Survey area:

- It occurs adjacent or in close proximit to a number of conservation reserves including Moore River National Park, Namming Nature Reserve, Hill River Nature Reserve and an unnamed conservation park south of Badgingarra National Park
- The pre-European vegetation associaitions of both Vegetation Association 999, 1031 and 1035 are below the 30 % threshold level retention. Vegetation associations 949 and 1030 are above the 30 % threshold level at all levels
- Site 1 and Site 8 occur within the regional vegetation mapping of Heddle *et al*. (1980) which indicates that Site 8 occurs within the Gingin Complex and Site 1 occurs with Coonambidgee Complex. The Gingin Complex is below the 30 % threshold level remaining, whereas the Coonambidgee Complex is above the 30 % threshold level (Local Biodiversity Program – latest updates 2013)
- The Survey area occurs within the road reserve, and includes the cleared shoulder and some small areas that have been previously disturbed due to roadworks. 76.8 hectares (ha) of the Survey area has been mapped as cleared. However, the rest of the road reserve contains native vegetation which is generally in Excellent condition. The predominant vegetation of the Survey area was Banksia woodlands with heaths and shrublands interspersed depending on topography and soils. 219.4 ha of the Survey area was rated Good condition or better

  A section of Site 6 supports wetland vegetation, sedgeland and shrubland on low-lying seasonally inundated areas, with a floristic assemblage that is generally restricted to the wet areas. A creekline crosses the Survey area at the northern end of Site 3 and in this area there is a degraded *Eucalyptus rudis - Melaleuca rhaphiophylla* woodland

- No Threatened Ecological Communities were identified within the Survey area or during the field survey. One DPaW listed Priority Ecological Community was recorded within the Survey area, this is the 'Swan Coastal Plain *Banksia attenuata- Banksia menziesii* woodlands' (Priority 3). The vegetation type 'Banksia woodlands' recorded in Site 1 and Site 2 is representative of this PEC, with 23.1 ha of this vegetation mapped within Site 1 and 33.3 ha within Site 2. This vegetation is also equivalent to the Priority 3 PEC '*Banksia* dominated woodlands on the Swan Coastal Plain Interim Biogeographic Regionalisation for Australia region'
- The Survey area (Sites 1-7) had a very high floristic diversity and 665 flora taxa (including subspecies and varieties) representing 75 families and 271 genera were recorded in the Survey area during the field survey. This total comprises 562 (84.5 %) native taxa and 103 (15.5 %) introduced taxa, as well as three planted species. Site 8 was less floristically diverse than the other sites as the majority of the road reserve was highly degraded
- The field survey did not record any Threatened flora taxa within the Survey area, however, 13 Priority-listed flora taxa were recorded. These were: *Grevillea synapheae* subsp. *minyulo* (Priority 1), *Lyginia excelsa* (Priority 1), *Chordifex reseminans* (Priority 2), *Guichenotia alba* (Priority 3), *Phlebocarya pilosissima* subsp. *pilosissima* (Priority 3), *Stylidium hymenocraspedum* (Priority 3), *Banksia dallanneyi* subsp. *pollosta* (Priority 4), *Conostephium magnum* (Priority 4), *Desmocladus elongatus* (Priority 4), *Diuris ?recurva* (Priority 4), *Grevillea rudis* (Priority 4), *Grevillea saccata* (Priority 4), *Hibbertia helianthemoides sensu lato.* (Priority 4)
- Six fauna habitat types were identified during the field survey including: Banksia woodland; mixed shrublands; low heath and shrubland; low lying shrublands and sedgeland; parkland cleared/Marri (*Corymbia calophylla*); and highly modified areas
- The native fauna habitat types recorded are not well-represented in the local region, given that historic broad scale clearing has resulted in a mostly cleared agricultural landscape with only isolated habitat remnants remaining. As a result, the fauna habitat present within the Survey area provides important linkage, facilitating landscape connectivity and providing for fauna dispersal between larger isolated bushland fragments
- Based on field surveys and a likelihood of occurrence assessment it was concluded that one fauna species of conservation significance (Carnaby's Black Cockatoo) is known to occur in the Survey area and four fauna species of conservation significance are likely to occur
- The woodlands, shrublands and heathlands habitat types within the Survey area provide high value foraging resources for the Carnaby's Black Cockatoo. There is 261.7 ha of foraging habitat for the Black Cockatoo in the Survey area. These habitat types occur in all eight sites. The Survey area is located within the known breeding range of the species and the foraging resources and potential breeding trees were recorded within Site 3 (along Minyulo Brook) and in Site 8. There were 195 potential breeding trees (i.e. Diameter at Breast Height (DBH) greater than 300/500 mm DBH) recorded within the Survey area: 59 within Site 3, 134 within Site 8 and one within Site 5 and one within Site 7.

GHD (2016) Brand Highway, Western Australia-Various Sections: SLK 74-150 Biological Survey.

Executive Summary

Main Roads Western Australia (Main Roads) proposes to upgrade various sections of the Brand Highway, Western Australia between SLK 74 to 150 (the Project Area). The Project Area is located within the Shire of Dandaragan and includes five sections along the Brand Highway including Study Area 1 (SLK 77.54 to 79.7), Study Area 2 (SLK 120 to 125.13), Study Area 3 (SLK 130.1 to 136), Study Area 4 (SLK 139 to 146.9) and Study Area 5 (SLK 148.8 to 152).

The proposed works aim to widen the seal lanes to 3.5 metres and widen sealed and unsealed shoulders to one metre on either side of the existing Brand Highway. To facilitate these works Main Roads requires clearing of some road-side vegetation.

Main Roads commissioned GHD Pty Ltd (GHD) to undertake a biological assessment to identify vegetation, flora and fauna constraints within the Project Area to assist in project design.

The desktop and field assessment determined:

- Environmentally Sensitive Areas (ESAs) were recorded within Study Areas 2, 3, 4 and 5. These are associated with the Badgingarra National Park which occurs immediately west of these Areas.
- Three conservation areas were identified within 20 km of the Study Areas. The Badgingarra National Park runs immediately adjacent to the western edge of the Brand Highway road reserve of Study Areas 4 and 5. An unnamed Conservation Park (Reserve 41986), south of Badgingarra National Park, runs adjacent to the western edge of the road reserve of Study Areas 2 and 3. The Namming Nature Reserve is located approximately 1.6 kms to the west of Study Area 1.
- There were eight vegetation types recorded in the Study Areas, most of which are well represented at a local government authority (LGA) level with greater than 30% remaining, with the exception of Vegetation Type 6 (Beard's Vegetation Association 1031 and 1035); and Vegetation Type 6 (Beard's Vegetation Association 1031). Vegetation Types 6 and 8 are underrepresented, with less than 30% remaining at an LGA level.
- One vegetation type, Vegetation Type 1, 'Banksia Woodland on White Sand' recorded in Study Area 1 was considered to align with the Priority Ecological Community (PEC) (Priority 3) "Banksia dominated woodlands of the Swan Coastal Plain Interim Biogeographic Regionalisation of Australia (IBRA) region". This vegetation type covers an extent of 7.5 ha of Study Area 1.
- A geomorphic wetland was recorded within Study Area 1. A buffer is recommended to protect vegetation associated with and dependant on the wetland.
- Four-hundred and forty flora taxa from 67 families were recorded from the Study Areas during the field surveys. This total comprised 375 (85 %) native taxa and 65 (15%) introduced taxa.

- The flora "Likelihood of Occurrence Assessment" concluded that two flora taxa listed under the *EnvironmentProtection and Biodiversity Conservation Act 1999* (EPBC Act) and *Wildlife Conservation Act 1950* (WC Act) are considered "likely to occur" within the Study Areas. However, no EPBC Act- or WC Act-listed flora was recorded during the survey.
- The flora "Likelihood of Occurrence Assessment" also concluded that 46 Department of Parks and Wildlife (DPaW) listed Priority Flora are considered "likely to occur" or "possible to occur" within the Study Areas. The results of the field surveys indicated that 13 DPaW-listed Priority Flora were recorded from the Study Areas.
- Two conservation significant fauna were recorded from the Study Areas, including the Carnaby's Black-Cockatoo (listed Endangered) and the Rainbow Bee-eater (listed as Migratory).
- There is approximately 202.7 hectares (ha) of suitable foraging habitat for Carnaby's Black-Cockatoo within the Study Areas. This habitat comprises Marri-Banksia woodland, Banksia woodland, Low Banksia Woodland and Heath Shrubland, which provide high value foraging resources for the species, including Marri nuts and a diversity of proteaceous species. The habitat assessment identified four potential breeding trees with a suitable DBH throughout the Study Area 1; however, they did not contain any hollows. An approximate area of 3.3 ha of suitable roosting habitat occurs within Study Area 1 (Figure 6), however there was no evidence of roosting recorded during the survey.
- The Rainbow Bee-eater was recorded from Study Area 2, which is considered suitable non-breeding habitat for the Rainbow Bee-eater. The Rainbow Bee-eater's habitat is broadly represented in the local region, with 385,099 ha of potential habitat with 20 km of the Study Areas.
- The "likelihood of occurrence" assessment of Conservation Significant fauna taxa indicated by database searches concluded that one fauna taxon listed under the EPBC and WC Acts that is "likely to occur" (i.e. the Carnaby's Black-Cockatoo) and four other conservation significant fauna taxa that are "likely to occur" or "possible to occur".
- An assessment was undertaken to determine whether the Project will have a significant impact upon Matters of National Environmental Significance (MNES) and it was determine that **referral is recommended** to the Australian Government for the following reasons:
  - Carnaby's Black-Cockatoo foraging (and potential roosting) habitat was recorded within all of the Study Areas.

    Important habitat covering an extent of 3.42 ha for the Endangered *Eucalyptus absita* (Badgingarra Box) was recorded within Study Area 5 and associated with the north-eastern portion of Vegetation Type 6..
  - Whilst it is unlikely that Study Area 1 offers important habitat to the Chuditch, due to the fragmentation of remnant vegetation and the entirety of the Study Area being surrounded by broad acre agriculture, it may form part of an ecological linkage between larger reserves (particularly the conservation reserves south and south-west of this Study Area).
- A preliminary assessment of the project against the Ten Clearing Principles has been undertaken and has determined that the Project is likely to be **at variance** with Principles (a), (b), (c) and (e). The Project **maybe at variance** with Principles (d) and (h) due to uncertainty with regard to the clearing extent. The Project is **not likely to be at variance** with Principles (f) and (i) if Main Roads develop a buffer zone for the geomorphic wetland to avoid clearing such vegetation in Study Area 1. GHD also recommends Main Roads avoid clearing of vegetation within and along the ephermeral drainage line in Study Area

Woodman Environmental (2017) Brand Highway Passing Lanes: Survey for Listed Threatened and Priority Flora Taxa.

EXECUTIVE SUMMARY

Main Roads Western Australia (Main Roads) is proposing to undertake the construction of a series of passing lanes for the Brand Highway, north of Perth between Granville and Mimegarra (the Project) which will require clearing of native vegetation. Main Roads commissioned Woodman Environmental Consulting Pty Ltd (Woodman Environmental) to undertake survey for significant flora to support the approvals process for the Project.

The field survey was conducted from the 6th – 10th of November 2017, with vegetation located within the entire Survey Area grid searched for significant flora. A total of 22 significant flora taxa were recorded within the Survey Area, all of which were DBCA-listed Priority taxa. No Threatened flora taxa were recorded during the survey. The majority of these taxa are relatively widespread, and known from a reasonable number of populations across their range. Four significant taxa, being *Catacolea enodis* (P2), *Desmocladus microcarpus* (P2), *Lyginia excelsa* (P1) and *Tetratheca angulata* (P3), are considered to be of higher significance, either because they have a relatively restricted range, and/or are known from relatively few (less than 10) populations. However, all of these taxa were recorded outside the Survey Area, and it is expected that there are additional locations of these taxa in the immediate vicinity of the Survey Area.

A total of 11 significant flora taxa known from the vicinity of the Survey Area could not be surveyed for due to survey timing not coinciding with the flowering period (for taxa which flowering material is essential for identification and/or detection of the taxon). An assessment of likelihood of presence of these taxa identified a total of six of these DBCA listed priority taxa which could possibly occur in the Survey Area including *Acacia cummingiana* (P3), *Diuris recurva* (P4), *Drosera marchantii* subsp. *prophylla* (P3), *Thysanotus vernalis* (P3), *Thelymitra apiculata* (P4) and *Thelymitra pulcherrima* (P2). No additional significant taxa are considered likely to occur in the Survey Area.

Ecologia (2017) Main Roads Western Australia Brand Highway Passing Lanes Banksia Woodlands TEC Assessment.

EXECUTIVE SUMMARY

Main Roads Western Australia (MRWA) is proposing to construct thirteen passing lanes on the Brand Highway between Gingin and Eneabba in Western Australia. Three flora and vegetation surveys of the study area have been previously been undertaken, however the EPBC Act listed "Banksia Woodlands of the Swan Coastal Plain" Threatened Ecological Community (TEC), which was listed as Endangered by the Department of Environment and Energy on 16 September 2016, was not considered to have accurately delineated. Consequently, *ecologia* was commissioned by MRWA to undertake an additional vegetation survey to collect floristic data that would enable the TEC to be more accurately characterised and mapped.

A field survey was undertaken in November 2017, where thirty-one 10 x 10 m floristic quadrats were assessed. A total of 113 quadrats have therefore now been assessed within the close vicinity of the Brand Highway study area over four surveys undertaken in 2016 and 2017. Of these, 40 quadrats from the Swan Coastal Plain were assessed as being representative of the Banksia Woodlands of the Swan Coastal Plain TEC, based on the key diagnostic criteria outlined in the *Approved Conservation Advice* (Threatened Species Scientific Committee 2016). Ten patches of the TEC in 'Good' or better condition, ranging from 0.56 to 178 ha in size, were mapped across the southern section of the study area on the Swan Coastal Plain.

The Banksia Woodlands TEC within the study area is characterised by dominant *Banksia attenuata*, *B. menziesii* or *B. prionotes* in the upper canopy layer, together with a highly diverse understorey of shrubs and herbs. Emergent *Corymbia calophylla* and *Eucalyptus todtiana* are also present within many examples of the community. A total of 352 vascular plant taxa were recorded across all the *Banksia* woodland quadrats assessed within the study area, with a mean species richness of 41.7 taxa. The most frequently occurring understorey species included *Burchardia congesta*, *Mesomelaena pseudostygia*, *Eremaea pauciflora*, *Bossiaea eriocarpa*, *Stirlingia latifolia*, *Alexgeorgea nitens*, and *Lyginia barbata*, which are also typical for the community in a broader context. Only 16 species were recorded in 50% or more *Banksia* woodland quadrats. This low number of frequently occurring species is indicative of high species turnover across the study area.

Hierarchical cluster analysis indicated that quadrats identified as representing the Banksia Woodlands TEC belong to several distinct clusters and do not form a cohesive floristic group, highlighting the high degree of understorey variability present within the community. *Banksia* woodland quadrats from the Swan Coastal Plain and the Geraldton Sandplain are intermixed, indicating that these communities, as broadly defined here, cannot be distinguished based on overall species composition.

Further details regarding the biological assessments are provided within TRIM as:

- Astron (2016) Brand Highway, Regans Ford Biological Survey (D16#715905)
- GHD (2016) Brand Highway Passing Lanes Biological Assessment (D16#350127)
- GHD (2016) Brand Highway, Western Australia-Various Sections: SLK 74-150 Biological Survey (D16#728602)
- Woodman Environmental (2017) Brand Highway Passing Lanes: Survey for Listed Threatened and Priority Flora Taxa.
- Ecologia (2017) Main Roads Western Australia Brand Highway Passing Lanes Banksia Woodlands TEC Assessment.

7 ADDITIONAL PRE CLEARING ACTIONS REQUIRED

The following table summarises what further pre-clearing impact assessment and vegetation management is required in accordance with CPS 818.

Table 3: Summary of Additional Management Actions

Impact of Clearing	Yes/No or NA	Further Action Required
1. The PCIA indicates that the clearing is 'Seriously at Variance', At Variance' or 'May be at Variance' with one or more of the clearing principles.	**Yes**	An offset proposal is required to be approved by DWER. The offset proposal must be approved prior to undertaking clearing of the area to which the offset is related.
2. The PCIA indicates that the clearing is at variance or may be at variance with clearing principle (g) land degradation, (i) surface or underground water quality or (j) the incidence of flooding.	**No**	No further action required.
3. The project involves clearing for temporary works (as defined by the permit under Condition 11 of CPS 818).	**No**	No further action required.
4a. The project is in part of a region that has annual rainfall greater than 400mm and is south of the 26th parallel of latitude. **4b.** The project will require movement of soil in conditions other than dry conditions.	**Yes**	**4a.** Go to number 4b**.** **4b.** If work schedule changes and work is required in non-dry conditions a Dieback Management Plan (DMP) will be prepared in consultation with DBCA prior to clearing the area to which the DMP is related. Where dieback survey and management plan is required Main Roads will engage DBCA for dieback services.
5. The proposal requires referral to either the WA EPA or the Commonwealth DoEE.	**Yes**	The proposal has been referred to the Commonwealth DoEE on 20/1/2017 as project EPBC 2017/7864. This project was deemed a controlled action on the 16/3/2017.

8 VEGETATION MANAGEMENT

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

9 OTHER STAKEHOLDER CONSULTATION

No stakeholder consultation was required for this project.

10 REFERENCES

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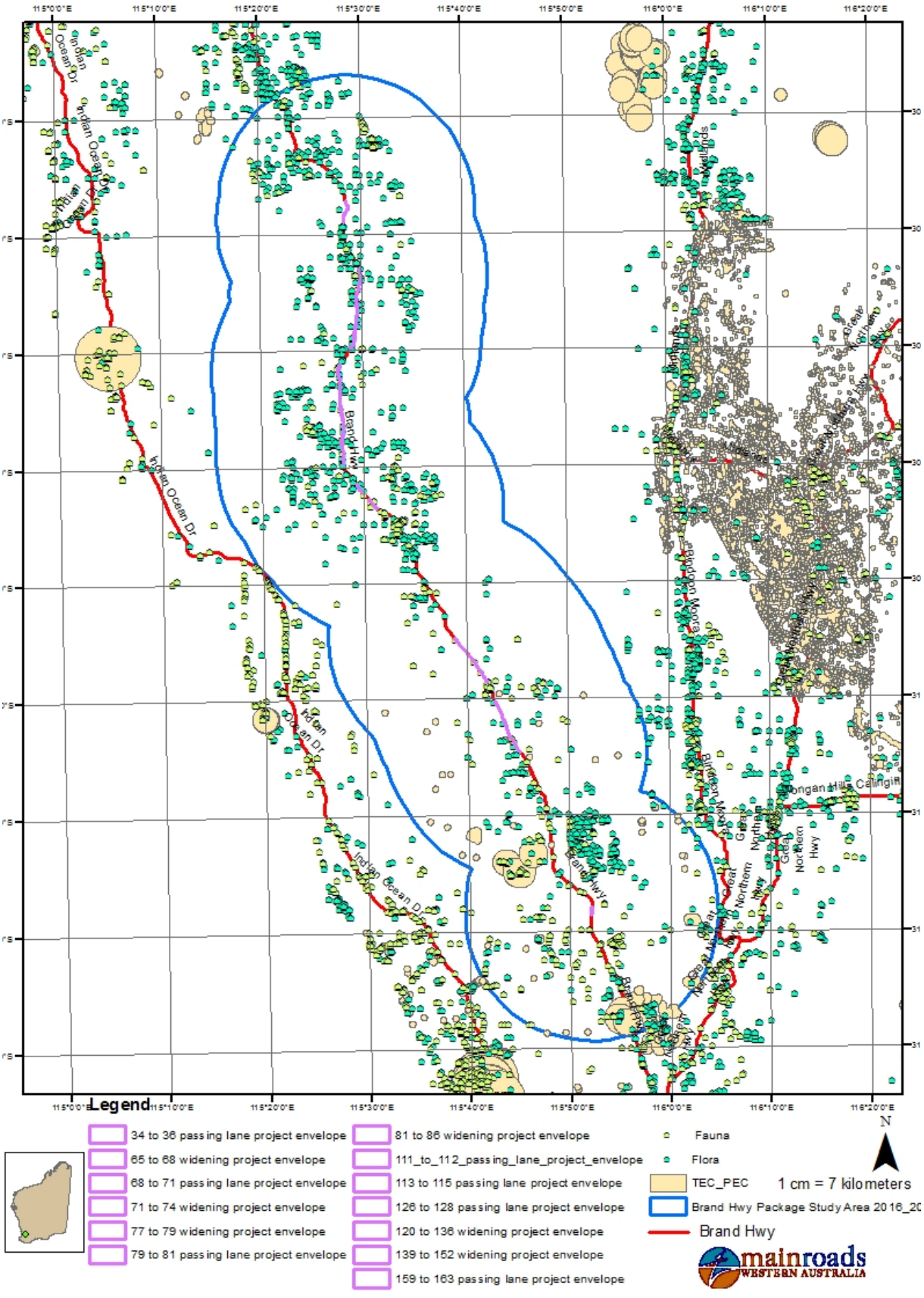
Woodman Environmental (2017) Brand Highway Passing Lanes: Survey for Listed Threatened and Priority Flora Taxa. (Awaiting final report)

11 APPENDICES

Appendix	Title
Appendix A	DBCA Threatened Flora and Fauna Database Searches
Appendix B	Vegetation Management Plan

Appendix A: DBCA Threatened Flora and Fauna Database Searches



Appendix B: Vegetation Management Plan

Introduction

The Vegetation Management Plan (VMP) has been prepared, in accordance with CPS 818 conditions, by Main Roads for the purpose of managing native vegetation clearing impacts associated with the project. In specified circumstances, Main Roads VMP is required to be approved by DER as a condition of Main Roads Statewide Clearing Permit CPS 818.

Scope of the Vegetation Management Plan

The VMP highlights the key project management issues and provides actions required to be undertaken by Main Roads before, during and following project completion. The aim of the VMP is to provide management actions to avoid, mitigate and / or manage the clearing impacts and to allocate areas of responsibility required for the implementation of management actions identified. Timeframes for the completion of actions and monitoring are also provided.

When preparing the VMP an emphasis has been placed on management actions regarding the native vegetation clearing impacts, being determined by the variance level to the clearing principles ('Seriously at Variance', 'At Variance' and 'May be at Variance'). This project has been assessed as being at variance to Principle (a), (b), (d), (e) and (f), maybe at variance to Principle (h) and not likely to be at variance to the remaining Principles

The VMP actions will be incorporated into the project specific Environmental Management Plan (EMP). Construction contractors are also required to comply with Main Roads' standard environmental management contract specifications (required for Category 2 projects).

Vegetation clearing activities are required to be undertaken in accordance with the environmental management measures detailed in Main Roads Specifications 204 (Environment), 301 (Clearing) and 302 (Earthworks), 304 (Revegetation and Landscaping). All revegetation activities should be completed in accordance with Main Roads *Environmental Guideline Revegetation Planning and Techniques*. Topsoil will also be managed according to Main Roads *Topsoil Management Guideline*.

Scope of the Project Activities

This project involves widening sections of Brand Highway and the creation of four northbound and four southbound lanes between 65 and 163.4 SLK. This will increase the safety of the road by providing safe overtaking opportunities and improving the functionality of the road.

Communication

Native vegetation clearing and vegetation management will be communicated at induction, toolbox and/or contract meetings. Information located in the VMP will be communicated to all project and construction personnel, (including sub-contractors) prior to the commencement of project activities and during all phases of project implementation. Where necessary, Main Roads will liaise with the DER to obtain further advice regarding vegetation management

VMP Accountability

Persons name	Persons Role	Contact details
Matthew Baker	Project Manager	9956 1246 matthew.baker@mainroads.wa.gov.au
Emma Fitzgerald	Environment Officer	9323 5435 emma.fitzgerald@mainroads.wa.gov.au

VEGETATION MANAGEMENT PLAN				
Project Component	**Management Action**	**Monitoring/Maintenance Program**	**Responsible Person**	**Completion Timeframe**
Standard Vegetation Clearing and Fauna Management				
Avoid and manage project clearing	• Minimise vegetation clearing and the area of disturbance on ground by utilising existing cleared area where possible.	NA – clearing footprint minimised during assessment stage.	Project Manager	Prior to clearing commencing.
	• At the pre-start meeting (or equivalent) – Provide clear maps indicating the areas approved to be cleared (limited to the project area described in the Assessment Report) to the crew undertaking the clearing works.	One compliance inspection will occur prior to clearing. Record sheet will be signed at the pre-start meeting by all personnel and emailed to the Environment Officer.	Project Manager	Prior to clearing commencing
	• Have on site a copy of the ECD and implement all actions within, which contain al VMP actions.	One compliance inspection will occur prior to clearing.	Project Manager / Environment Officer	Prior to clearing commencing
	• All vegetation proposed to be cleared will be demarcated on site prior to the commencement of project activities. Environmental Officer (or delegated EO) responsible for confirming the clearing line is pegged and complies with approval area • Any vegetation or trees that are to be retained will be marked accordingly.	One compliance inspection will occur prior to clearing. Site will be driven/walked to ensure site is marked out and is ready for clearing.	Project Manager / Environment Officer	Prior to clearing commencing
	• Clearing of vegetation shall not exceed the limits of clearing and mature trees especially, shall be conserved as far as practicable, and shall not be disturbed for such temporary works as side tracks, access tracks, temporary storage areas, campsites, spoil areas or site offices.	One compliance inspection will occur within two weeks once clearing has been completed. The project area will be driven/walked to ensure the extent of clearing was not exceeded and where possible/safe mature trees retained.	Project Manager / Environment Officer	Within two weeks once clearing has been completed
	• Any damage caused (beyond the extent of approvals) during the construction to vegetation, landforms, or fauna habitat shall be rehabilitated to the pre-clearing condition.	One compliance inspection will occur within two weeks once clearing has been completed. The project area will be driven to ensure no damage to vegetation, landforms or habitats occurred during construction.	Project Manager / Environment Officer	Within two weeks once clearing has been completed
	• Burning of cleared vegetative materials or burning within the road reserve shall not be permitted under any circumstances. Cleared vegetation will be used during any rehabilitation activities and either mulched or respread. If Main Roads has no use for stockpiled vegetation, this material may be made available for use by members of the public.	One compliance inspection will occur within two weeks once clearing has been completed. The project area will be driven to ensure the extent of clearing was not exceeded.	Project Manager / Environment Officer	Within two weeks once clearing has been completed

VEGETATION MANAGEMENT PLAN				
Project Component	**Management Action**	**Monitoring/Maintenance Program**	**Responsible Person**	**Completion Timeframe**
	Clearing activities must be completed in accordance with Main Roads Specifications: 204 (Environment), 301 (Clearing), 302 (Earthworks). Specifications are available from iRoads link.	One compliance inspection will occur within one week of the commencement of clearing. The project area will be examined to ensure clearing activities comply with MRWA specifications.	Project Manager / Environment Officer	Within two weeks once clearing has been completed
Principle (a) - Biodiversity	Where possible avoid and limit the amount of clearing within the project area. An Environment specialist will remain on site when clearing activities are undertaken.	1 compliance inspection will occur post construction. Monitoring will consist of driving/walking the project area to ensure that the amount of clearing is minimised. 1 surveillance audit of the project VMP progress will be undertaken during construction.	Project Manager	Completion of construction.
	Ensure that previously disturbed areas are cleared rather than areas of vegetation in good condition.	1 compliance inspection will occur pre construction. Monitoring will consist of driving/walking the project area to ensure that the amount of clearing is minimised.	Project Manager	Completion construction
Principle (b) – Fauna	• An Environment specialist will remain on site when clearing activities occur in the vicinity of the fauna habitat. • Clearing will progress slowly to ensure fauna has opportunity to move on • 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. • Minimise impacts on areas of vegetation where significant fauna have been recorded or may potentially occur. • No pets, traps or firearms are allowed within the project area. • Fauna are not to be fed or intentionally harmed or killed.	One compliance inspection will occur prior to clearing of fauna habitat areas identified.	Project Manager / Environment Officer	Prior and during clearing activities.
Principle (d) – Threatened Ecological Communities (TEC)	Environment specialist to be on site during clearing in TEC or TEC buffer.	1 compliance inspection will occur post construction. Monitoring will consist of driving/walking the project area to ensure that the amount of clearing is minimised.	Project Manager / Environment Officer	Prior to clearing commencing
Principle (f) – Wetland / watercourses	Environment specialist to be on site during clearing in watercourse/wetland areas.	One compliance inspection will occur prior to clearing. The project site will be driven to ensure all areas of riparian vegetation have been fenced.	Project Manager	Prior to clearing commencing.

VEGETATION MANAGEMENT PLAN				
Project Component	**Management Action**	**Monitoring/Maintenance Program**	**Responsible Person**	**Completion Timeframe**
	All riparian vegetation proposed to be cleared will be demarcated on site prior to the commencement of project activities. All damage caused (beyond the extent of approvals) during the construction to riparian vegetation habitat shall be rehabilitated to the pre-clearing condition.	One compliance inspection will occur prior to clearing. The project site will be driven to ensure all areas of riparian vegetation have been demarcated and ready for clearing to commence.	Project Manager	Monitoring - within three months of project completion.
Principle (h) – Conservation estate	Implement weed hygiene and control measures to prevent new weed infestations from occurring within the project area and the spread of existing weeds. Remove or kill any weeds growing in project area that are likely to spread and result in environmental harm to adjacent areas of native vegetation that are in good or better condition. Clean earth moving machinery of soil and vegetation prior to entry and exit to project areas adjacent to conservation areas.	One compliance inspection of weed infestations will occur pre and post clearing . Ongoing monitoring will occur annually as part of maintenance program.	Project Manager	Completion construction
Dieback and weed management.	• Clean earth moving machinery of soil and vegetation prior to entry to project areas adjacent to conservation areas. • Ensure no weed affected soil, mulch, fill or other material is brought into the area cleared. • Restrict movement of machines and other vehicles to the limits of the areas cleared. • Should clearing be required outside of dry soil conditions, Main Roads will engage DBCA to survey, map and provide management recommendations for clearing process	Machinery checked prior to entering project site adjacent to conservation areas. Adherence to hygiene management plans (where prepared)	Project Manager	Project lifespan/ ongoing
Weed Control	• Any declared pests identified will be eradicated. • In project areas adjacent to conservation areas a post construction check will be completed and any weeds identified will be added into the annual weed program to monitor and remove the weeds.	One annual compliance inspection undertaken to manage spread of weeds.	Project Manager	Five years from commencement of clearing
Standard Record Keeping Management				
Record Keeping - Clearing	Maintain the following records for the areas cleared: • a map and an ESRI Shapefile showing the location of the areas cleared; • the size of the area cleared (in hectares); and • the dates on which the clearing was done in day/month/year format.	Monitoring will be undertaken through the corporate audit process and remedial actions managed through Main Roads internal incident management process.	Environment Officer	Records maintained during construction and finalised within 4 weeks of the completion of clearing.

VEGETATION MANAGEMENT PLAN				
Project Component	**Management Action**	**Monitoring/Maintenance Program**	**Responsible Person**	**Completion Timeframe**
Record Keeping – OP	Maintain the following records for the offset area: • a map and an ESRI Shapefile showing the location of areas that have had offset actions implemented; • a description of the offset actions implemented (include the dates of actions); and • the size of the area where offset actions were undertaken (in hectares).	Monitoring will be undertaken through the corporate audit process and remedial actions managed through Main Roads internal incident management process.	Environment Officer	Records maintained during offset activities and finalised within 4 weeks of offset proposal successful completion
Record Keeping – VMP	Maintain the following records for the project area: • the location of the area to which the VMP has had action applied; • an ESRI Shapefile showing the locations of the areas of clearing for project activities; • a description of the management actions implemented; and • the size of the area to which the management actions were applied (in hectares).	Monitoring will be undertaken through the corporate audit process and remedial actions managed through Main Roads internal incident management process.	Environment Officer	Records maintained during vegetation management activities and finalised within 4 weeks of all management plan actions being completed.