



**ASSESSMENT REPORT
AND VEGETATION MANAGEMENT PLAN**

Brand Highway Widening and Passing Lane Package 2016/2017

February 2017

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Attachment 1-Astron (2016) Brand Highway, Regans Ford Biological Survey (D16#715905)
Attachment 2-GHD (2016) Brand Highway Passing Lanes Biological Assessment (D16#350127)
Attachment 3-GHD (2016) Brand Highway, Various Sections: SLK 74-150 Biological Survey
(D16#728602)

SUMMARY

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:

- Widening 65-68.63 SLK within the Shire of Gingin
- Widening 71.02-74 SLK within the Shire of Gingin
- Widening 77.3-79.84 SLK within the Shire of Dandaragan
- Widening 81.71-86 SLK within the Shire of Dandaragan
- Widening 120-136 SLK within the Shire of Dandaragan
- Widening 139-152 SLK within the Shire of Dandaragan
- Northbound Passing Lane 34.83-36 SLK within the Shire of Gingin
- Southbound Passing Lane 68.63-71.02 SLK within the Shire of Gingin
- Northbound Passing Lane 79.84-81.1 SLK within the Shire of Dandaragan
- Southbound Passing Lane 111.08-112.9 SLK within the Shire of Dandaragan
- Northbound Passing Lane 113.6-115.94 SLK within the Shire of Dandaragan
- Southbound Passing Lane 126.2-128.38 SLK within the Shire of Dandaragan
- Northbound Passing Lane 159.8-163.6 SLK within the Shire of Dandaragan
- Southbound Passing Lane 160.1-163.4 SLK within the Shire of Dandaragan

Area proposed to be cleared:

- Widening 65-68.63 SLK=2.2ha
- Widening 71.02-74 SLK=1.8ha
- Widening 77.3-79.84 SLK=1.6ha
- Widening 81.71-86 SLK=2.6ha
- Widening 120-136 SLK=6ha
- Widening 139-152 SLK=4.6ha
- Northbound Passing Lane 34.83-36 SLK=1.3ha
- Southbound Passing Lane 68.63-71.02 SLK=2.7ha
- Northbound Passing Lane 79.84-81.71 SLK=2.1ha
- Southbound Passing Lane 111.08-112.9 SLK=2.2ha
- Northbound Passing Lane 113.6-115.94 SLK=2.2ha
- Southbound Passing Lane 126.2-128.38 SLK=2.5ha
- Northbound and southbound Passing Lane 159.8-163.6 SLK=6ha

Total=37.8ha

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.

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:
 - At variance to Principle (a) as the project involves the removal of 9 priority flora species, 15.2ha 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 15.2ha 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
 - Maybe at variance to Principle (h) as part of the project is adjacent to conversation reserve.
 - Not likely to be at variance to the remaining Clearing Principles.
- Three biological surveys were completed for this project to cover the project areas.
- 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.
- Submissions have been sought from stakeholders. At this time no responses have been received. This document will be updated upon the close of the submission period.
- DER approval for an Offset and Vegetation Management Plan will be sought.

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

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 C.

- Clearing will be limited to the smallest possible area
- An Environmental Assistant will remain on site during the clearing
- 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.

1. 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 Environment Regulation (DER) for revegetation plans, vegetation management plans, dieback management plans or offset proposals.

2. 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 2017. The works will provide safe passing opportunities and increase the functionality of the road.

2.1 Project Location

The project areas occur at various sections along Brand Highway:

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
Longitude: 115.4761

The project area is shown in Figure 1-13:



Legend

- 65_to_68_SLK_Length
- Brand Hwy

1 cm = 138 meters

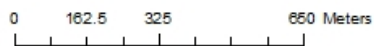


Figure 1 – Project Area Widening 65-68.63 SLK

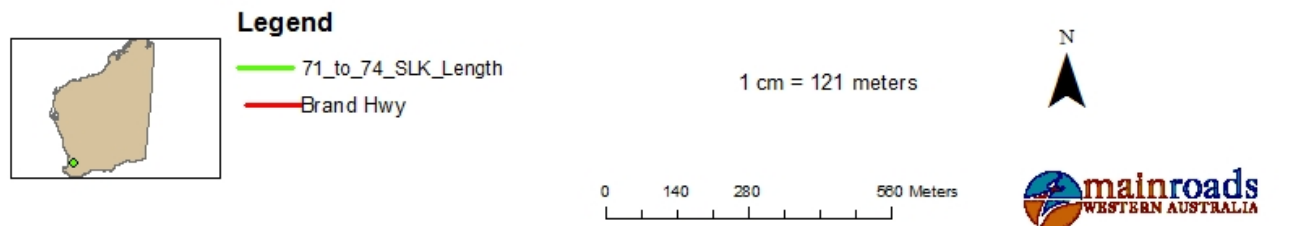


Figure 2 – Project Area Widening 71.02-74 SLK



Legend

- 77.3-79.84_SLK_location
- Brand Hwy

1 cm = 96 meters

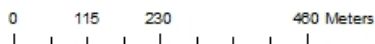


Figure 3 – Project Area Widening 77.3-79.84 SLK



Legend

- 81_to_86_SLK_Length
- Brand Hwy

1 cm = 149 meters

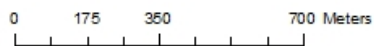
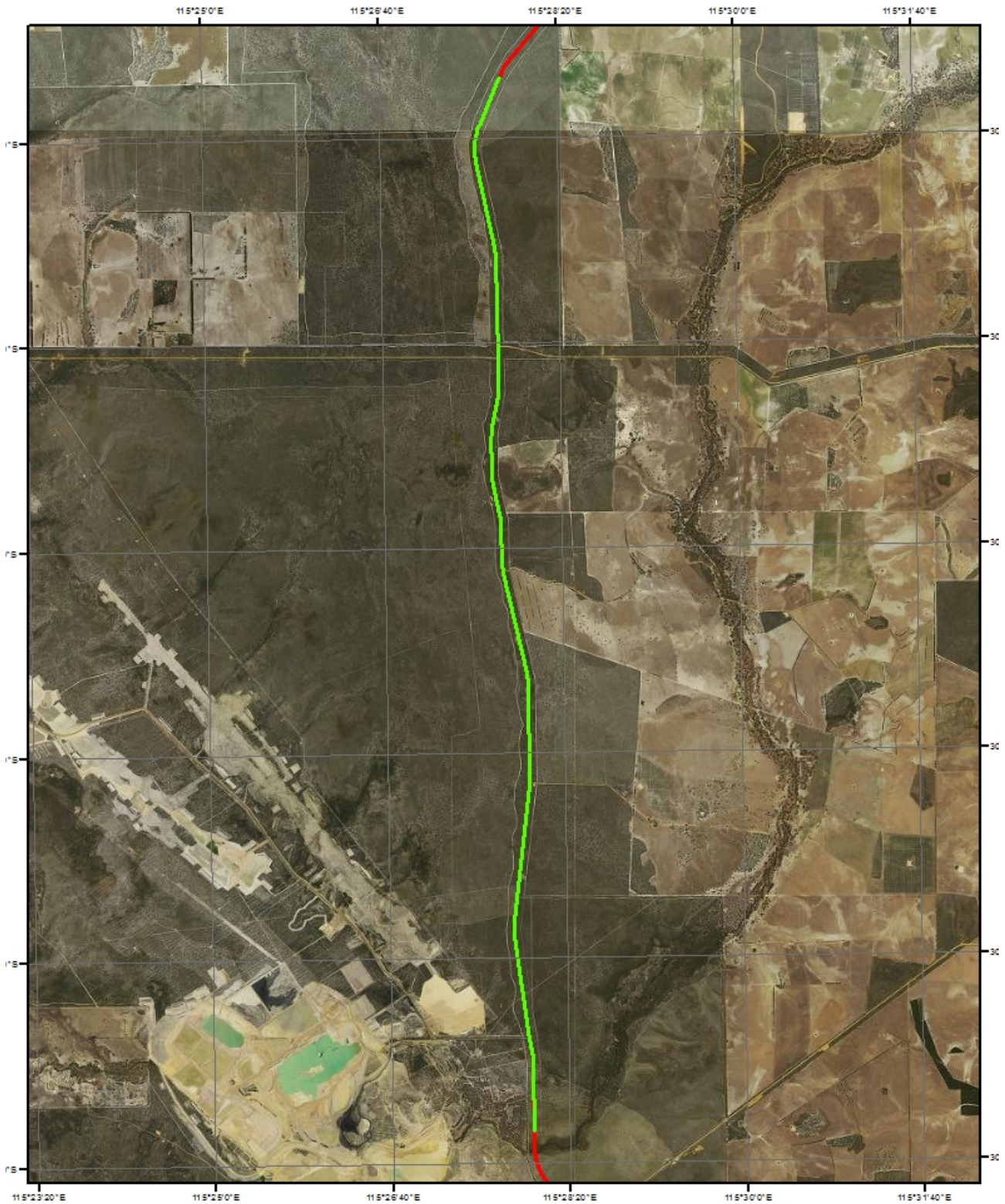


Figure 4 – Project Area Widening 81.71-86 SLK



Legend

- 120_to_136_SLK_length
- Brand Hwy

1 cm = 710 meters

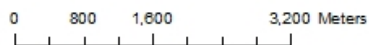


Figure 5 – Project Area Widening 120-136 SLK



Legend

- 139_to_152_SLK_length
- Brand Hwy

1 cm = 566 meters

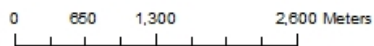
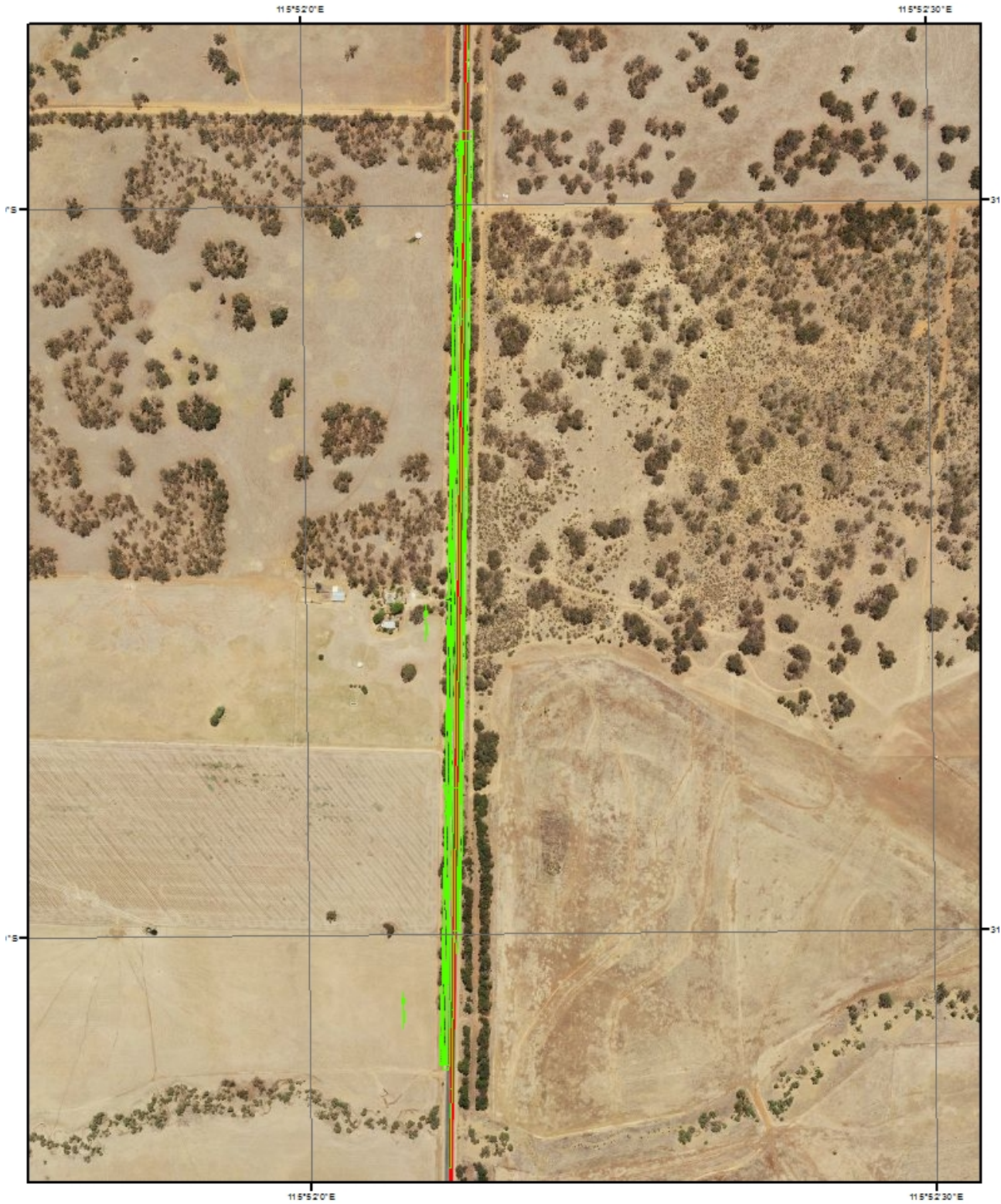


Figure 6– Project Area Widening 139-152 SLK



Legend

- 34_36_Design
- Brand Hwy

1 cm = 60 meters

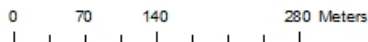


Figure 7 – Project Area Northbound Passing Lane 34.83-36 SLK



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



Legend

- 79_81_Design
- Brand Hwy

1 cm = 68 meters



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



Legend

- 111_112_Design
- Brand Hwy

1 cm = 76 meters

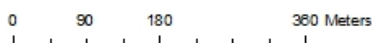


Figure 10– Project Area Southbound Passing Lane 111.08-112.9 SLK



Legend

- 113-115 and 126-128 Design
- Brand Hwy

1 cm = 70 meters

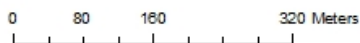


Figure 11 – Project Area Northbound Passing Lane 113.6-115.94 SLK



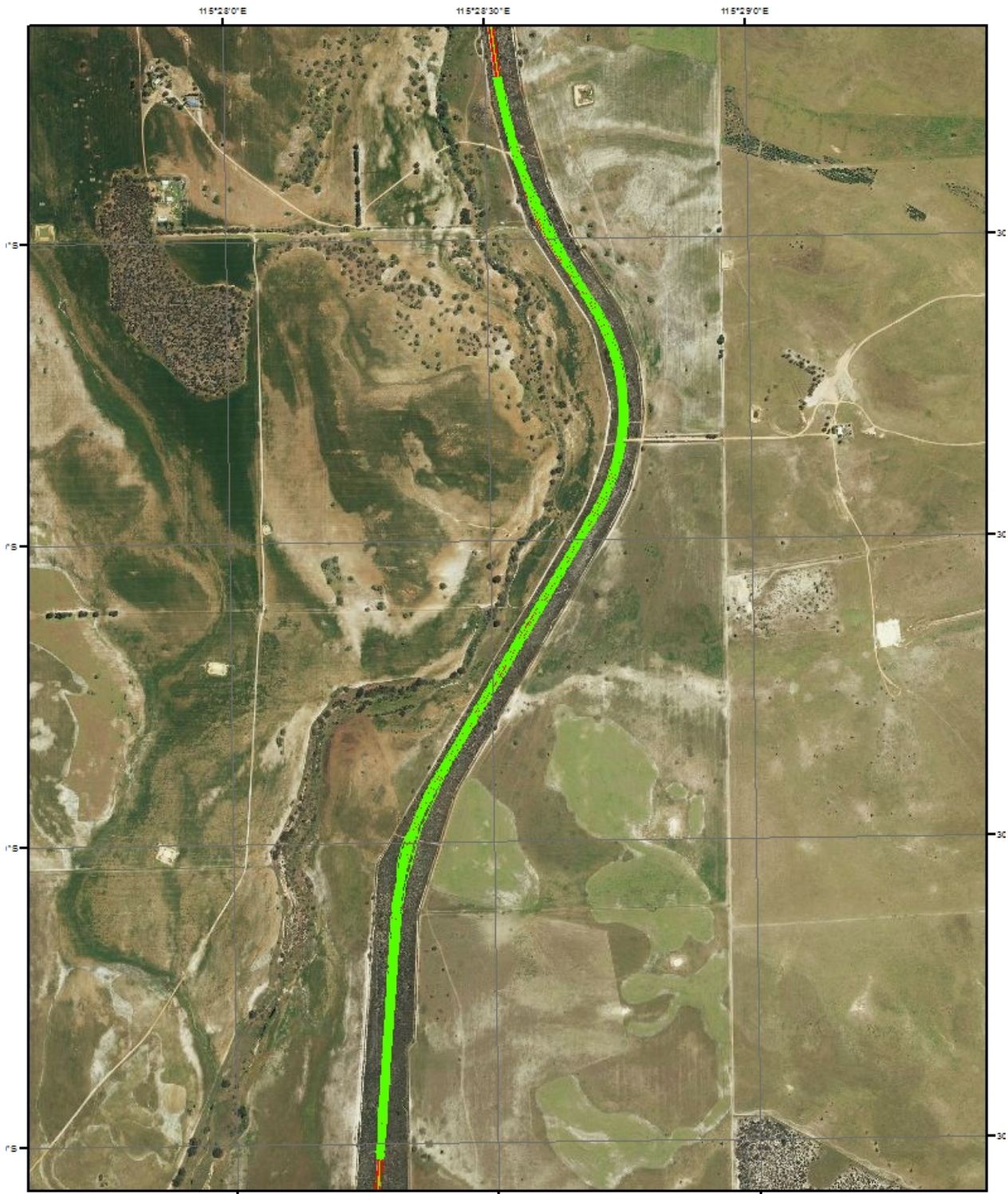
Legend

- 113-115 and 126-128 Design
- Brand Hwy

1 cm = 105 meters



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



Legend

- 160-163 Design
- Brand Hwy

1 cm = 146 meters

0 175 350 700 Meters



Figure 13 – Project 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:

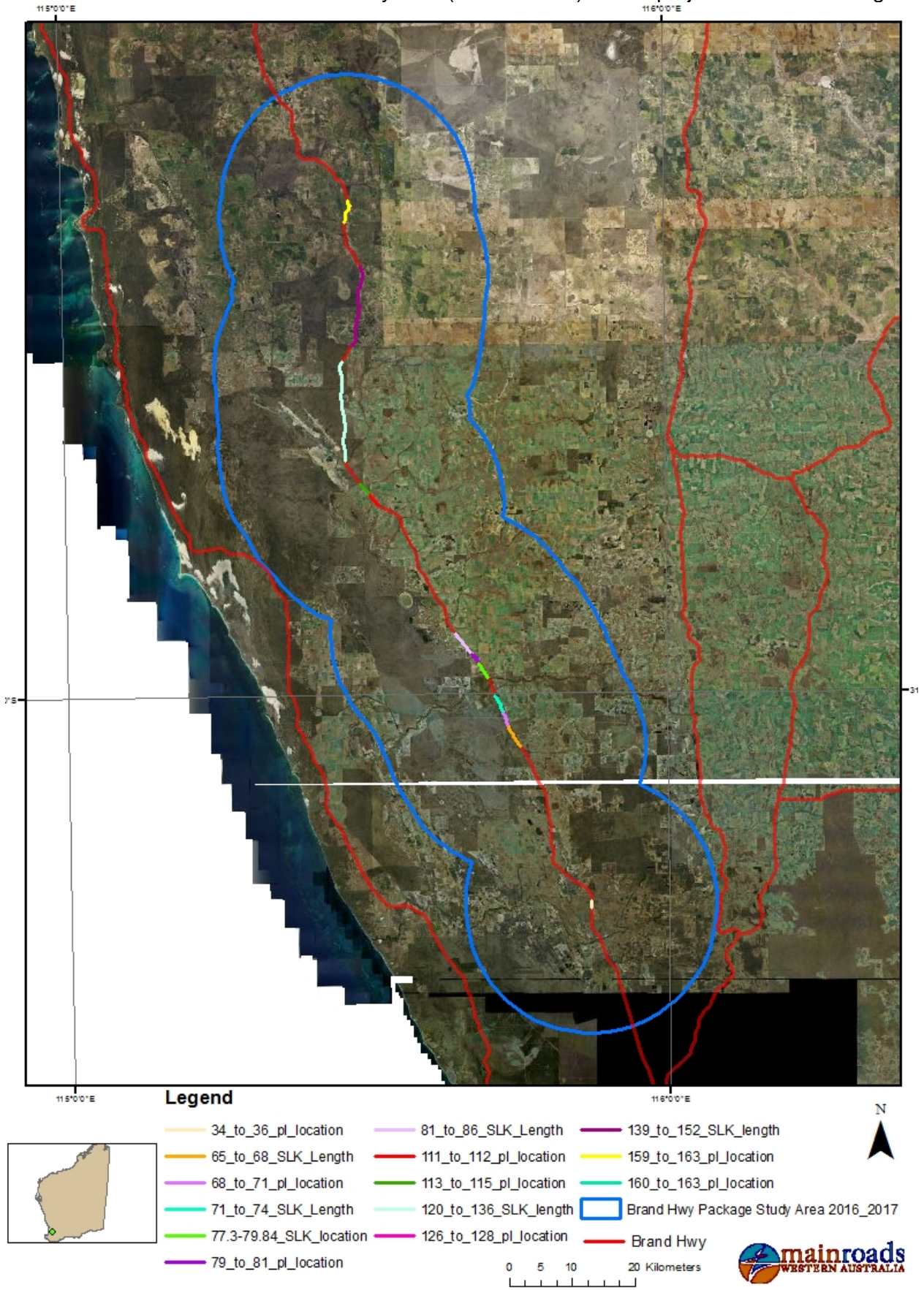


Figure 14 – Project Location and Study Area

3. METHODOLOGY

3.1 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.

3.2 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 project area. A summary of the outcome of the survey is provided in Section 5. The methodology used for the biological survey is provided in the Biological Survey report in D16#715905 (Astron 2016), D16#350127 (GHD 2016) and D16#728602 (GHD 2016)

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

4. 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.

4.1 Measures to Avoidance 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.

4.2 Existing Vegetation Details

4.2.1 Project site vegetation description

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

Widening 65-68.63 SLK

This project area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in very good condition. The project 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 project area is in excellent to degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition. The project 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 *Adenanthos cygnorum* subsp. *cygnorum* and *Eremaea pauciflora* var. *pauciflora* open shrubland over *Stirlingia latifolia* low open shrubland over *Mesomelaena pseudostygia* very open sedgeland.

PI04

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.

PI05

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 project area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition. The project 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* and *Eremaea pauciflora* over Sedgeland of *Desmocladius 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*, *Desmocladius subterranea*, *Lyginia barbata* over Scattered Herbs of *Drosera* spp. and *Burchardia congesta*.

Widening 81.71-86 SLK

This project area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition. The project 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 *Adenanthos cygnorum* subsp. *cygnorum* and *Eremaea pauciflora* var. *pauciflora* open shrubland over *Stirlingia latifolia* low open shrubland over *Mesomelaena pseudostygia* very open sedgeland.

PI02:

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.

PI03:

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.

(PI04):

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 raphiophylla* 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 project area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition. The project 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*, *Desmocladius* 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 project area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in completely degraded condition. The project 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 sanguineus*, *Hibbertia hypericoides*, *H. subvaginata*, *Leucopogon oldfieldii*, *Stirlingia inkrassate* over Low Open Shrubland *Banksia shuttleworthiana*, *Hakea conchifolia*, *Jacksonia floribunda* over Sedgeland of *Dasyogon bromeliifolius*, *Mesomelaena pseudostygia*, *Xanthorrhoea priessii*, *Desmocladius subterranea* over Scattered Herbs of *Drosera 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*, *Dasyogon bromeliifolius*, *Desmocladius 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 *Leucopogon 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 project area is in degraded to completely degraded (EPA and DPaW, 2015) condition. The project 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 project area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in very good to excellent condition. The project 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 project area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in very good condition. The project 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 project area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority being in excellent to very good condition. The project area is comprised of 4 vegetation types:

Banksia attenuata and *B. menziesii* woodland over mixed shrubland and sedgeland

Woodland of *Banksia 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 raphiophylla* woodland

Eucalyptus rudis – *Melaleuca raphiophylla* 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*, *Desmocladius* 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 project area is in excellent to completely degraded condition (EPA and DPaW, 2015) condition with the majority in excellent to very good condition. The project 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*, *Desmocladius* 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 project area is in excellent to very degraded (EPA and DPaW, 2015) condition with the majority in excellent to very good condition. The project 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*, *Desmocladius* 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 project area is in excellent to completely degraded (EPA and DPaW, 2015) condition with the majority in excellent condition. The project 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., *Desmocladius* 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:

- 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 MRWA site visit on 23 May 2016, GHD and Astron Biological Surveys and aerial imagery. |

77 to 79 SLK and 79 to 81 SLK

Widening 77.3-79.84 SLK=1.6ha. This project 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 project 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 |
| Vegetation Association Statewide Veg Assoc No. 1030 | 139,012.86 | 88,997.10 | 64.02 | 17.98 |
| Vegetation Association In IBRA region Veg Assoc No. 1030 in the IRBA Swan Coastal Plain region | 134,788.56 | 86,061.30 | 63.85 | 16.11 |
| Vegetation Association Statewide Veg Assoc No. 1035 | 5,018.34 | 494.12 | 9.85 | 53.65 |
| Vegetation Association In IBRA region 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 project 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 project 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 |
| Vegetation Association Statewide Veg Assoc No. 1030 | 139,012.86 | 88,997.10 | 64.02 | 17.98 |
| Vegetation Association In IBRA region | 134,788.56 | 86,061.30 | 63.85 | 16.11 |

| | | | | |
|--|------------|------------|-------|-------|
| Veg Assoc No. 1030 in the IRBA Swan Coastal Plain region | | | | |
| Vegetation Association Statewide Veg Assoc No. 1031 | 269,490.91 | 88,606.02 | 32.88 | 42.30 |
| Vegetation Association In IBRA region 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 project 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 |
| Vegetation Association Statewide Veg Assoc No. 1030 | 139,012.86 | 88,997.10 | 64.02 | 17.98 |
| Vegetation Association In IBRA region 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 project 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 project 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 project 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 |
| Vegetation Association Statewide Veg Assoc No.1031 This row is obtained from the report sheet 2a | 269,490.91 | 88,606.02 | 32.88 | 42.30 |
| Vegetation Association In IBRA region Veg Assoc No.1031 in the IRBA Geraldton Sandplains region | 241,349.97 | 83,154.99 | 34.45 | 44.13 |

| | | | | |
|---|------------|------------|-------|-------|
| This row is obtained from the report sheet 2a | | | | |
| 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 project 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 |
| Vegetation Association Statewide Veg Assoc No.7 This row is obtained from the report sheet 2a | 179,724.65 | 23,104.48 | 12.86 | 5.26 |
| Vegetation Association In IBRA region 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 |
| Vegetation Association Statewide Veg Assoc No.1030 This row is obtained from the report sheet 2a | 139,012.86 | 88,997.10 | 64.02 | 17.98 |
| Vegetation Association In IBRA region 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 |
| Vegetation Association Statewide Veg Assoc No.1031 This row is obtained from the report sheet 2a | 269,490.91 | 88,606.02 | 32.88 | 42.30 |
| Vegetation Association In IBRA region 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 project 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 project 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 project 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 tottiana* (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 tottiana* (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 project 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 tottiana* (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)

4.3 Assessment Against the 10 Clearing Principles

In assessing whether the project is likely to have a significant impact on the environment, the project was assessed against the ten clearing principles (EP Act 1986, Schedule 5).

The project is:

- At variance to Principle (a), (b), (d), (e) and (f)
- Maybe at variance to Principle (h)
- 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 is at variance to this Principle | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------------|--|-----------------------------|-----------------------------------|------------------------------|---------|--------|--------------|-----------------------------------|------------------------------|-----------------------------|------------|-------------|---|---|-----------------------------|------------|-----------------------------|---|---|-------------------------------|------------|-------------|---|---|----------------------------------|------------|-----------------------------|---|---|
| | <p>This project involves the clearing of up to 37.8ha of native vegetation across 14 project areas. The vegetation condition, mapped Vegetation Association and vegetation type are discussed above.</p> <p>Within the study area there are known records of 37 declared rare flora (DRF) and 165 priority flora. No DRF were identified within the survey area during the biological surveys, however 22 priority flora species were identified. These are:</p> <ul style="list-style-type: none"> • <i>Grevillea synapheae</i> subsp. <i>minyulo</i> (Priority 1) • <i>Lyginia excelsa</i> (Priority 1) • <i>Chordifex reseminans</i> (Priority 2) • <i>Onychosepalum microcarpum</i> (Priority 2) • <i>Allocasuarina ramosissima</i> (Priority 3); • <i>Grevillea makinsonii</i> (Priority 3); • <i>Guichenotia alba</i> (Priority 3) • <i>Haemodorum loratum</i> (Priority 3) • <i>Hypocalymma gardneri</i> (Priority 3) • <i>Hypocalymma serrulatum</i> (Priority 3); • <i>Phlebocarya pilosissima</i> subsp. <i>pilosissima</i> (Priority 3); • <i>Stylidium hymenocraspedum</i> (Priority 3); • <i>Tetrateca angulata</i> (Priority 3); • <i>Banksia dallanneyi</i> subsp. <i>pollostata</i> (Priority 4) • <i>Conostephium magnum</i> (Priority 4); • <i>Desmocladus elongatus</i> (Priority 4); • <i>Diuris ?recurva</i> (Priority 4) • <i>Eucalyptus macrocarpa</i> subsp. <i>elachantha</i> (Priority 4); • <i>Grevillea rudis</i> (Priority 4); • <i>Grevillea saccata</i> (Priority 4) • <i>Hibbertia helianthemoides sensu lato</i>. (Priority 4) • <i>Hypolaena robusta</i> (Priority 4); and • <i>Schoenus griffinianus</i> (Priority 4). <p>Of these the following species occur within the project envelope:</p> <table border="1" data-bbox="300 1666 1441 2038"> <thead> <tr> <th>Species</th> <th>Status</th> <th>Found within</th> <th>Locations within project envelope</th> <th>Locations within survey area</th> </tr> </thead> <tbody> <tr> <td><i>Grevillea makinsonii</i></td> <td>Priority 3</td> <td>139-152 SLK</td> <td>1</td> <td>4</td> </tr> <tr> <td><i>Hypocalymma gardneri</i></td> <td>Priority 3</td> <td>120-136 SLK and 139-152 SLK</td> <td>4</td> <td>7</td> </tr> <tr> <td><i>Hypocalymma serrulatum</i></td> <td>Priority 3</td> <td>120-136 SLK</td> <td>2</td> <td>3</td> </tr> <tr> <td><i>Stylidium hymenocraspedum</i></td> <td>Priority 3</td> <td>120-136 SLK and 139-152 SLK</td> <td>2</td> <td>5</td> </tr> </tbody> </table> | | | | Species | Status | Found within | Locations within project envelope | Locations within survey area | <i>Grevillea makinsonii</i> | Priority 3 | 139-152 SLK | 1 | 4 | <i>Hypocalymma gardneri</i> | Priority 3 | 120-136 SLK and 139-152 SLK | 4 | 7 | <i>Hypocalymma serrulatum</i> | Priority 3 | 120-136 SLK | 2 | 3 | <i>Stylidium hymenocraspedum</i> | Priority 3 | 120-136 SLK and 139-152 SLK | 2 | 5 |
| Species | Status | Found within | Locations within project envelope | Locations within survey area | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Grevillea makinsonii</i> | Priority 3 | 139-152 SLK | 1 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hypocalymma gardneri</i> | Priority 3 | 120-136 SLK and 139-152 SLK | 4 | 7 | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Hypocalymma serrulatum</i> | Priority 3 | 120-136 SLK | 2 | 3 | | | | | | | | | | | | | | | | | | | | | | | | | |
| <i>Stylidium hymenocraspedum</i> | Priority 3 | 120-136 SLK and 139-152 SLK | 2 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | |

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| <i>Tetradlea angulata</i> | Priority 3 | 139-152 SLK | 1 | 3 |
| <i>Conostephium magnum</i> | Priority 4 | 120-136 SLK and 139-152 SLK | 20 | 67 |
| <i>Desmocladius elongatus</i> | Priority 4 | 139-152 SLK | 3 | 9 |
| <i>Grevillea rudis</i> | Priority 4 | 139-152 SLK | 1 | 6 |
| <i>Hypolaena robusta</i> | Priority 4 | 120-136 SLK | 2 | 3 |

As evident from the table above the nine species that are to be impacted by the project activities were also found outside the project envelope within the survey area. 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 project area. All of the P3 and P4 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.

Within the study area there are records of 38 known protected fauna species. Of these species only the 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. systema) 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 project area is the Commonwealth listed "Banksia Woodlands of the Swan Coastal Plain". This project involves the removal of up to 15.2ha of vegetation that represents this TEC.

Given the removal of plants from 9 priority flora species, 15.2ha of TEC and Carnaby's Black Cockatoo foraging habitat this project clearing is 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.

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| Methodology | DPAW shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016) MRWA GIS Shapefiles |
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(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 |
|----------|--|
| | <p>Within the study area there are known records of 38 protected fauna species. During the surveys the following conservation status species were identified:</p> <ul style="list-style-type: none"> • <i>Calyptrorhynchus latirostris</i> (Carnaby's Black Cockatoo)-Endangered <p>The following species were determined to have a high likelihood of occurring in the project area:</p> <ul style="list-style-type: none"> • <i>Dasyurus geoffroii</i> (Chuditch)-Vulnerable • <i>Falco peregrinus</i> (Peregrine Falcon) • <i>Ardea modesta</i> (Eastern Great Egret)-Migratory • <i>Plegadis falcinellus</i> (Glossy Ibis)-Migratory • <i>Tringa nebularia</i> (Common Greenshank)-Migratory • <i>Tringa glareola</i> (Wood Sandpiper)-Migratory • <i>Calidris ruficollis</i> (Red-necked Stint)-Migratory • <i>Philomachus pugnax</i> (Ruff)-Migratory • <i>Asphidites ramsayi</i> (Woma)-Specially protected • <i>Morelia spilota</i> subsp. <i>imbricata</i> (Carpet Python)- Specially protected • <i>Neelaps calonotos</i> (Black-striped Snake)-P3 • <i>Macropus irma</i> (Western Brush Wallaby)-P4 <p>Of these species the only one likely to be present within the project area and impacted by this project is the Carnaby's Black Cockatoo.</p> <p>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 project areas all contain foraging habitat suitable for Carnaby's Black Cockatoo as outlined below:</p> <ul style="list-style-type: none"> • Widening 65-68.63 SLK=5.13ha within the project envelope along a 3.6km stretch of road (Maximum of 2.2ha will be cleared) • Widening 71.02-74 SLK=3.98ha within the project envelope along a 3km stretch of road (Maximum of 1.8ha will be cleared) • Widening 77.3-79.84 SLK=3.27ha within the project envelope along a 2.58km stretch of road (Maximum of 1.6ha will be cleared) • Widening 81.71-86 SLK =3.8ha within the project envelope along a 4.3km stretch of road (Maximum of 2.6 ha will be cleared) • Widening 120-136 SLK=10.3ha within the project envelope along a 15km stretch of road (Maximum of 6ha will be cleared) • Widening 139-152 SLK=9.95ha within the project envelope along a 13km stretch of road. (Maximum of 4.6ha will be cleared) • Northbound Passing Lane 34.83-36 SLK=0.96ha within the project envelope along a 1.8km stretch of road (Maximum of 1.3ha will be cleared) • Southbound Passing Lane 68.63-71.02 SLK=4.9ha within the project envelope along a 2.98km stretch of road (Maximum of 2.7ha will be cleared) • Northbound Passing Lane 79.84-81.71 SLK=4ha within the project envelope along a 1.8km stretch of road (Maximum of 2.1ha will be cleared) • Southbound Passing Lane 111.08-112.9 SLK=3.7ha within the project envelope along a 1.9km stretch of road (Maximum of 2.2ha will be cleared) • Northbound Passing Lane 113.6-115.94 SLK=2.9ha within the project envelope along a 1.97km stretch of road (Maximum of 2.2ha will be cleared) • Northbound and southbound Passing Lane 159.8-163.6 SLK=5.33ha within the project envelope along a 3.8km stretch of road (Maximum of 6ha will be cleared) <p>There is a total of 48.27ha of Carnaby's Cockatoo foraging habitat along a 56km stretch of road. Up to 34.29ha of this will be removed along the 56km for this project. Within the survey area there is 544.4ha of foraging habitat identified. Therefore this project will involve the removal of 6.30% of the foraging habitat in the immediate area.</p> |

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| | <p>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.</p> <ul style="list-style-type: none"> • Northbound Passing Lane 34.83-36 SLK=50 potential breeding trees within the project envelope • Widening 120-136 SLK=1 potential breeding tree within the project envelope <p>The surrounding area has similar vegetation and habitat values to the project 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.</p> <p>It is unlikely that the project 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.</p> <p>Given the removal of up to 34.29ha of foraging habitat and up to 51 potential breeding trees that will be required for the works this project will be at variance to this Principle.</p> |
| Methodology | <p>DPAW Shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016)</p> |

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

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| Comments | Proposed clearing is not likely to be at variance to this Principle |
| | <p>Within the study area there are known records of 37 declared rare flora (DRF). However no DRF were identified within the survey area during the biological surveys.</p> <p>Given that no DRF were identified during the biological surveys and that the project 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.</p> |
| Methodology | <p>DPAW shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016)</p> |

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

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| Comments | Proposed clearing is at variance to this Principle |
| | <p>Within the study area there are known records of 6 Threatened Ecological Communities (TECs). These are:</p> <ul style="list-style-type: none"> • 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 |

| | |
|--------------------|---|
| | <ul style="list-style-type: none"> • Melaleuca huegelii - Melaleuca acerosa (currently M. systema) shrublands on limestone ridges • Perth to Gingin Ironstone Association • Shrublands and woodlands on Muchea Limestone <p>Within the GHD and Astron biological surveys it was identified that none of these TECs are present within the project area.</p> <p>The only TEC that was identified within the project area is the Commonwealth listed “Banksia Woodlands of the Swan Coastal Plains”. The project 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 project areas will be considered part of this TEC. Project area 34.83-36 SLK and 113.6-115.94 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 each project area are outlined below:</p> <ul style="list-style-type: none"> • Widening 65-68.63 SLK=5.30ha (Maximum of 2.2ha will be cleared) • Widening 71.02-74 SLK=3.33ha (Maximum of 1.8ha will be cleared) • Widening 77.3-79.84 SLK=3.13ha (Maximum of 1.6ha will be cleared) • Widening 81.71-86 SLK=2.95ha (Maximum of 2.6ha will be cleared) • Southbound Passing Lane 68.63-71.02 SLK=4.90ha (Maximum of 2.7ha will be cleared) • Northbound Passing Lane 79.84-81.71 SLK=3.86ha (Maximum of 2.1ha will be cleared) • Southbound Passing Lane 111.08-112.9 SLK=3.67ha (Maximum of 2.2ha will be cleared) <p>Across the project areas that represent the Banksia Woodlands of the Swan Coastal Plains TEC there is a total of 15.2ha 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 or 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.</p> <p>Given the removal of up to 15.2ha of vegetation that represents the “Banksia Woodlands of the Swan Coastal Plain” this project is at variance to this Principle.</p> |
| Methodology | DPAW shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016) |

(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.

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| Comments | Proposed clearing is at variance to this Principle |
| | <p>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 the project areas below 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:</p> <ul style="list-style-type: none"> • 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) |

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| | <ul style="list-style-type: none"> • 126 to 128 SLK, 139 to 152 SLK and 159 to 163 SLK (34.45% vegetation remaining in the IBRA region) <p>However the following project areas do represent an area that has been extensively cleared as less than the critical 30% threshold vegetation is remaining in the IBRA region:</p> <ul style="list-style-type: none"> • 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). <p>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 project areas that are mapped as Vegetation Associations 1035, 1031 and Gingin Complex may be significant as a remnant.</p> <p>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 project area. The native vegetation to be cleared ranges from degraded to completely degraded (EPA and DPaW, 2015) condition. Native vegetation 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 project envelope.</p> <p>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 project 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 project 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.</p> <p>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 project 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 project 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.</p> <p>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.</p> |
| Methodology | EPA and DPaW (2015) 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 |
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| | <p>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 project 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 project areas.</p> <p>Vegetation mapping undertaken during the biological surveys identified that the 34-36 SLK occurs on parkland cleared, 71-74 SLK project 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 project area.</p> <p>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.</p> <p>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.</p> |
| Methodology | <p>DoW and DPAW shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016)</p> |

(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% |
| | <p>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</p> | | | | | |

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|--------------------|---|
| | <p>and only a linear section will be removed wind erosion is unlikely to be significantly increased.</p> <p>The project 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.</p> <p>Given the above this proposed clearing is not likely to be at variance to this Principle.</p> |
| Methodology | <p>Natural Resource Management SLIP Shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016)</p> |

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

| Comments | Proposed clearing may be at variance to this Principle |
|--------------------|--|
| | <p>Within the study area there are conservation areas. The closest to the project areas are:</p> <ul style="list-style-type: none"> • Moore River National Park located over 6m to the west of the 65-68.63 SLK project area • Moore River National Park located over 797m to the south of the 71.02-74 SLK project area • Namming Nature Reserve located over 1.2km to the east of the 77.3-79.84 SLK project area • Namming Nature Reserve located over 735m to the south east of the 81.71-86 SLK project area. • Badgingarra National Park and an un-named Nature reserve are located 85m to the west/east of the 120-136 SLK project area. • Badgingarra National Park and an un-named Nature reserve are located 60m to the west of the 139-152 SLK project area. • Boonanarring Nature Reserve located over 4.1km to the north of the 34.83-36 SLK project area. • Moore River National Park located adjacent to the 68.63-71.02 SLK project area. • Namming Nature Reserve located over 597m to the east of the 79.84-81.1 SLK project area. • Un-Named Nature Reserve located 4.9km to the south of the 111.08-112.9 SLK project area • Un-named Nature Reserve located over 5km to the south of the 113.6-115.94 SLK project area • Un-named Nature Reserve located over 79m to the west of the 126.2-128.38 SLK project area • Hill River Nature Reserve is located over 1.4km to the south of the 159.8-163.6 SLK project area. <p>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. However this project may indirectly impact upon the Moore River National Park, two un-named nature reserves and Badgingarra National Park as the project area is adjacent to the reserve. Therefore this project clearing may be at variance to this Principle. Management measures will be put in place to minimise any potential indirect impacts to conservation areas.</p> |
| Methodology | DPAW shapefiles |

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

| | |
|--------------------|---|
| Comments | Proposed clearing is not likely to be at variance to this Principle |
| | <p>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 project 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 project areas. 65-68 SLK, 68-71 SLK, 71-74 SLK, 77-79 SLK, 79-81 SLK and 81-86 SLK are within the Moore River and certain Tributaries Proclaimed Surface Water Area. 139-152 SLK and 159-163 SLK are within the Hill River and Tributaries Catchment. 34-36 SLK, 65-68 SLK, 68-71 SLK, 71-74 SLK, 77-79 SLK, 79-81 SLK, 81-86 SLK, 111-112SLK and 113-114 SLK are within the Gingin Groundwater Area. 120-126 SLK is within the Gingin and Jurien Groundwater Area. 126-128 SLK, 139-152 SLK and 159-163 SLK are within the Jurien Groundwater Area. No project areas occur within Public Drinking Water Source Areas.</p> <p>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.</p> <p>Given the above this project is not likely to be at variance to this Principle.</p> |
| Methodology | DoW and DPAW 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% |
| | <p>As shown in the table above there is a low risk of flooding at all project areas except 79-81 SLK which has a high risk of flooding. The project 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.</p> <p>Given the above this project is not likely to be at variance to this Principle.</p> | | | | | |
| Methodology | Natural Resource Management SLIP Shapefiles Astron Biological Survey (2016) GHD Biological Survey (2016) GHD Biological Survey (2016) | | | | | |

5. SUMMARY OF BIOLOGICAL SURVEYS

There were three biological surveys 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'.

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 proximity 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 associations 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 Hedde *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 raphiophylla* 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. *pollostata* (Priority 4), *Conostephium magnum* (Priority 4), *Desmocladius 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.

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 *Environment Protection 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 Camaby'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 Camaby'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 Camaby'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:
 - Camaby'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 ephemeral drainage line in Study Area

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)

6. 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 AR indicates that the clearing is 'Seriously at Variance', 'At Variance' or 'May be at Variance' with one or more of the clearing principles. | Yes | 1. A Vegetation Management Plan (VMP) is required to be approved by DER. The VMP must be approved prior to undertaking clearing of the area to which the VMP is related 2. An offset proposal is required to be approved by DER. The offset proposal must be approved prior to undertaking clearing of the area to which the offset is related. |
| 2. The AR 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. |
| <p>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.</p> <p>4b. The project will require movement of soil in conditions other than dry conditions.</p> | <p>Yes</p> <p>No</p> | <p>4a. Go to number 4b.</p> <p>4b. No further action required. If work schedule changes and work is required in non-dry conditions a Dieback Management Plan (DMP) will be prepared in consultation with DPAW and approved by DER prior to clearing the area to which the DMP is related.</p> |
| 5. The proposal requires referral to either the WA EPA or the Commonwealth DotE. | Yes | <p>The proposal has been referred to the Commonwealth DotEE on 20/1/2017 as project EPBC 2017/7864.</p> <p>This project was deemed a controlled action on the 16/3/2017.</p> |

7. 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 C).

8. OTHER STAKEHOLDER CONSULTATION

No stakeholder consultation was required for this project.

9. REFERENCES

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Appendix A

Site Inspection Report



SITE INSPECTION REPORT – BRAND HIGHWAY – THREE SECTIONS

| | | | |
|---------------|-------------------------|-----------|--|
| Date: | 15/7/2016 | Location: | Brand Highway: 119-120, 129-130.1 and 146.9-148.8 SLK |
| Project Name: | Brand Hwy infill areas | | |
| Attendees: | V Clarke Ecologist MRWA | | |
| | Alix Chinnery EO MRWA | | |
| | Emma Fitzgerald EO MRWA | | |

ACTIONS TAKEN

- *Three areas along Brand Hwy were identified as lacking biological survey:*
 - 120-121
 - 129-130.1
 - and 146.9-148.8 SLK.
- *These sections have previously had biological survey to the north and south, and therefore a site visit was required to extrapolate vegetation and condition mapping, fauna habitat mapping and undertake targeted flora survey.*
- *Each area was traversed on foot to confirm mapping units and to search for conservation significant flora.*
- *Photographs were taken, mapping notes made and flora specimens taken where confirmation of priority flora was required.*

EXISTING ENVIRONMENT

Previous mapping (GHD) included broad vegetation units; within the survey area is a fine-scale mosaic of *Banksia*-dominated low open woodlands, low shrubland and heath, with small incursions of dampland/wetland vegetation.

All three areas contain at least one species of priority flora. The majority of areas are suitable foraging habitat for Black Cockatoos. No trees suitable for nesting are within any of the three surveyed areas.

The following three maps show the previously recorded vegetation types and conservation significant flora records, with extrapolated Main Roads vegetation mapping and results of targeted flora searches.

Figure 1 120-121 SLK

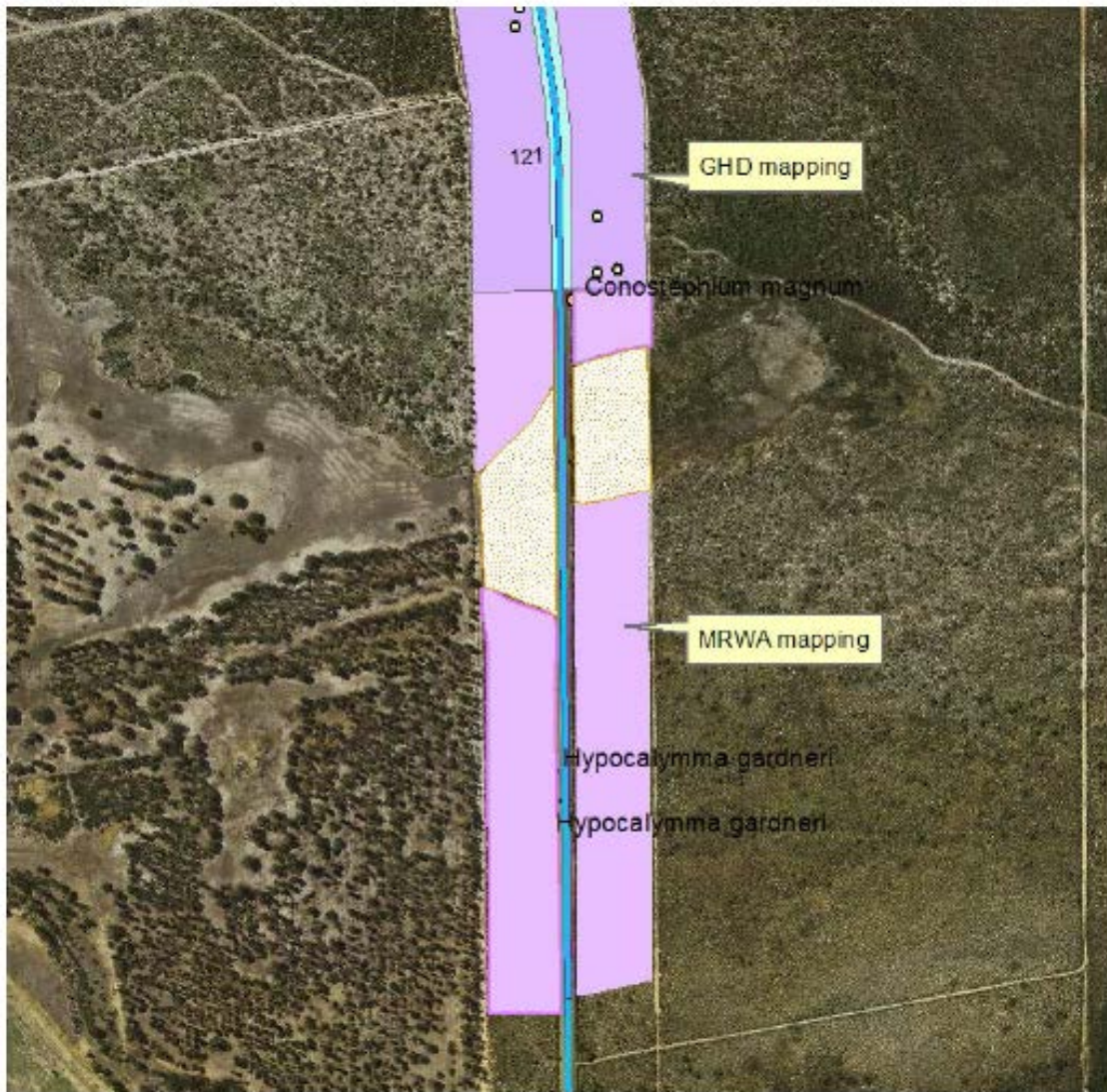


Figure 2 129-130 SLK

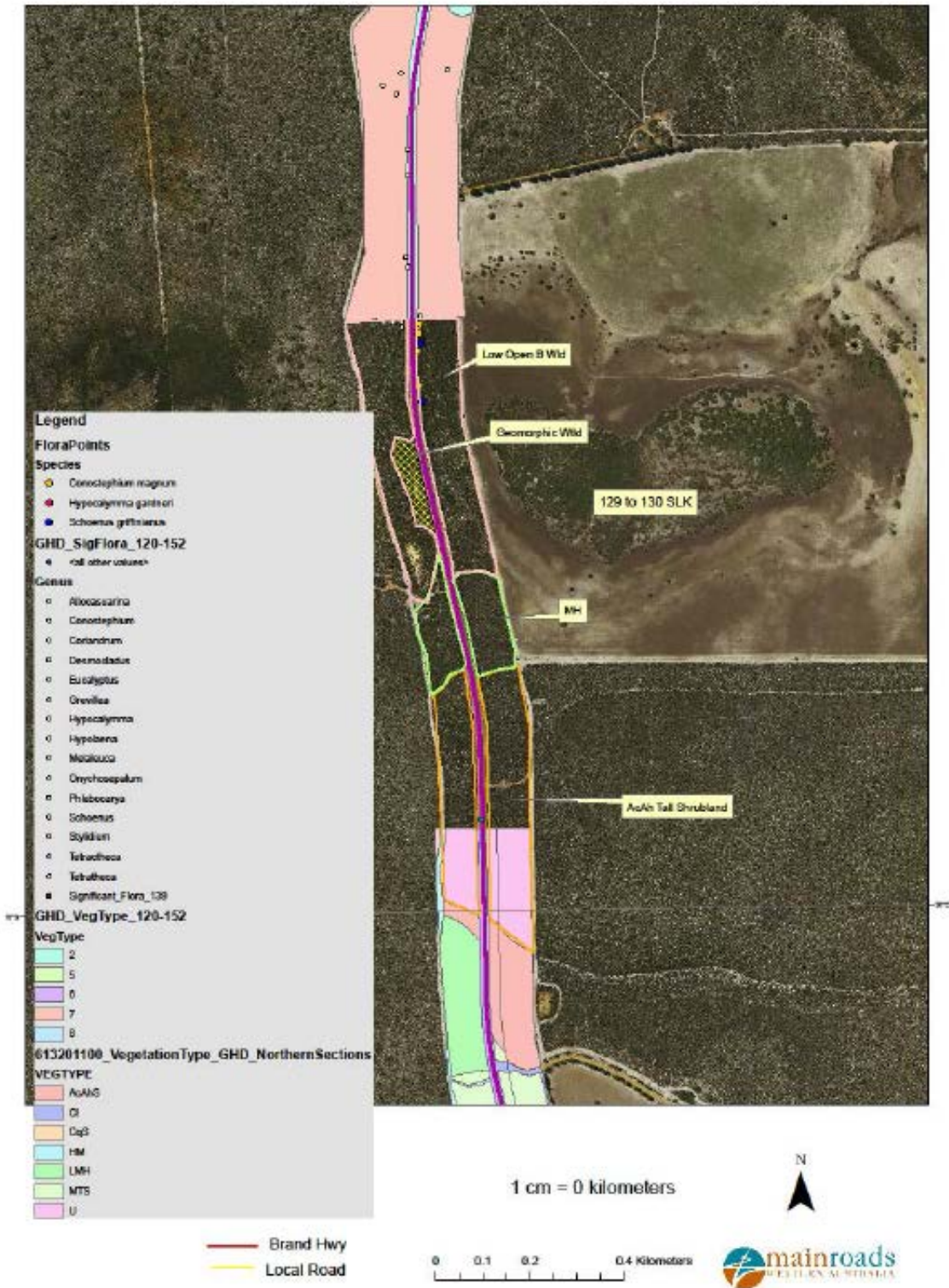
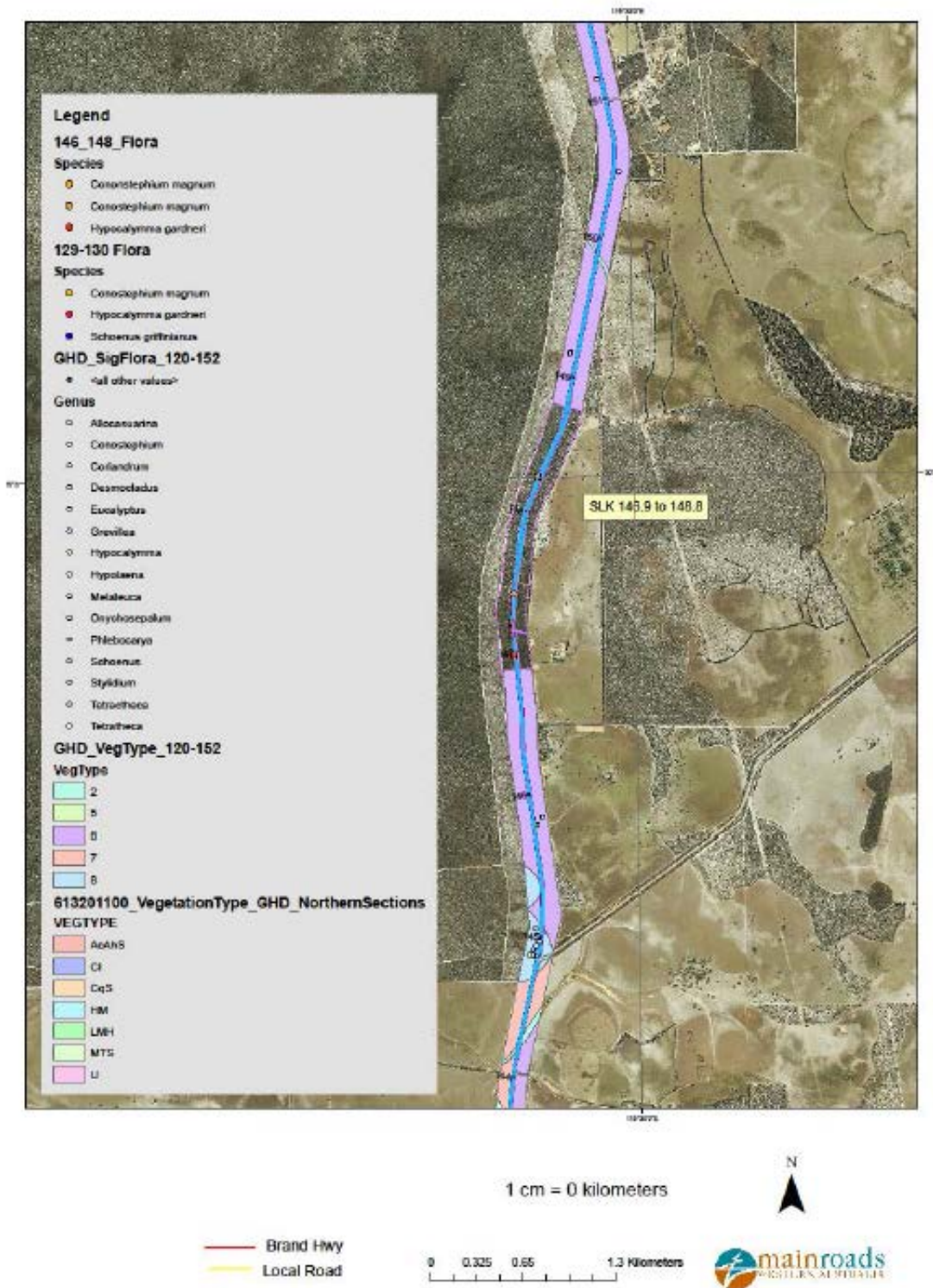


Figure 3 146-148 SLK



SITE DESCRIPTION

All three, small infill sections:

- *Are a fine mosaic of Banksia dominated woodlands over rich shrublands, or dense heath and low shrublands*
- *contain small areas of wetland or riparian vegetation where localised depressions or minor drainage occurs*
- *are habitat for a suite of priority flora; no threatened flora has previously been recorded or noted during these surveys*
- *are foraging habitat for Black Cockatoos; excluding the wetland/riparian vegetation areas*
- *do not contain eucalypts of sufficient DBH to provide nesting opportunities for Black Cockatoos*
- *were in predominantly excellent vegetation condition with only minor edge effects and weed incursions adjacent to the Highway and tracks, or small localised areas of degradation.*

SITE PHOTOS 119-120



119-120 SLK
Fine mosaic of Banksia Woodland and Low Heath



SITE PHOTOS 119-120



119-120 SLK
 Geomorphic wetland areas; least diversity
 Excellent condition



Extent of wetland areas west of Brand Hwy

SLK 120 to 121

A very open woodland of *Banksia prionotes* with occasional emergent *Eucalyptus todtiana* and *Adenanthos cygnorum* over *Hakea varia*, *Petrophile macrostachya*, *Conospermum crassinervium*, *Acacia pulchella*, *Leptospermum erubescens*, shrubland over *Ecdiocola monostachya*, *Conostylis setigera*, *Scaevola phlebopetala*, *Lechenaultia linearis*, *Opercularia vaginata*, *Hibbertia huegelii*.

Includes scattered occurrences of priority flora: *Hypocalymma gardneri* and *Conostephium magnum*.

In the geomorphic (broad) dampland there is a low heath of *Melaleuca* species with twiners of *Cassytha glabella* over a seasonal ephemeral layer of *Drosera* and Asteraceae species.

Predominantly in Excellent condition; localised disturbance and rubbish present but at a scale too small to map. No discernible dieback occurrences.

All of the woodland area would be considered quality foraging habitat for black cockatoos; the wetland/dampland area excluded.

SITE PHOTOS 129-130.1



129-130 SLK
 Geomorphic wetland areas;
 Excellent condition



129-130 SLK
 Banksia woodland
 Excellent condition

SLK 129 to 130

Banksia woodland of *B. menziesii* over *Daviesia physodes*, *Stirlingia latifolia*, *Chamelaucium uncinatum*, *B. shuttleworthiana*, over *Conostylis setigera*, *Lepidobolus preissianus*, *Burchardia* sp, *Caladenia flava*.

SITE PHOTOS 146.9-148.8



146.9-148.8 SLK
 Banksia woodland to Tall Shrubland
 Degraded areas close to existing road



146.9-148.8SLK
 Banksia woodland
 Excellent condition

Priority flora recorded:



Photo 1 *Hypocalymma gardneri* P3

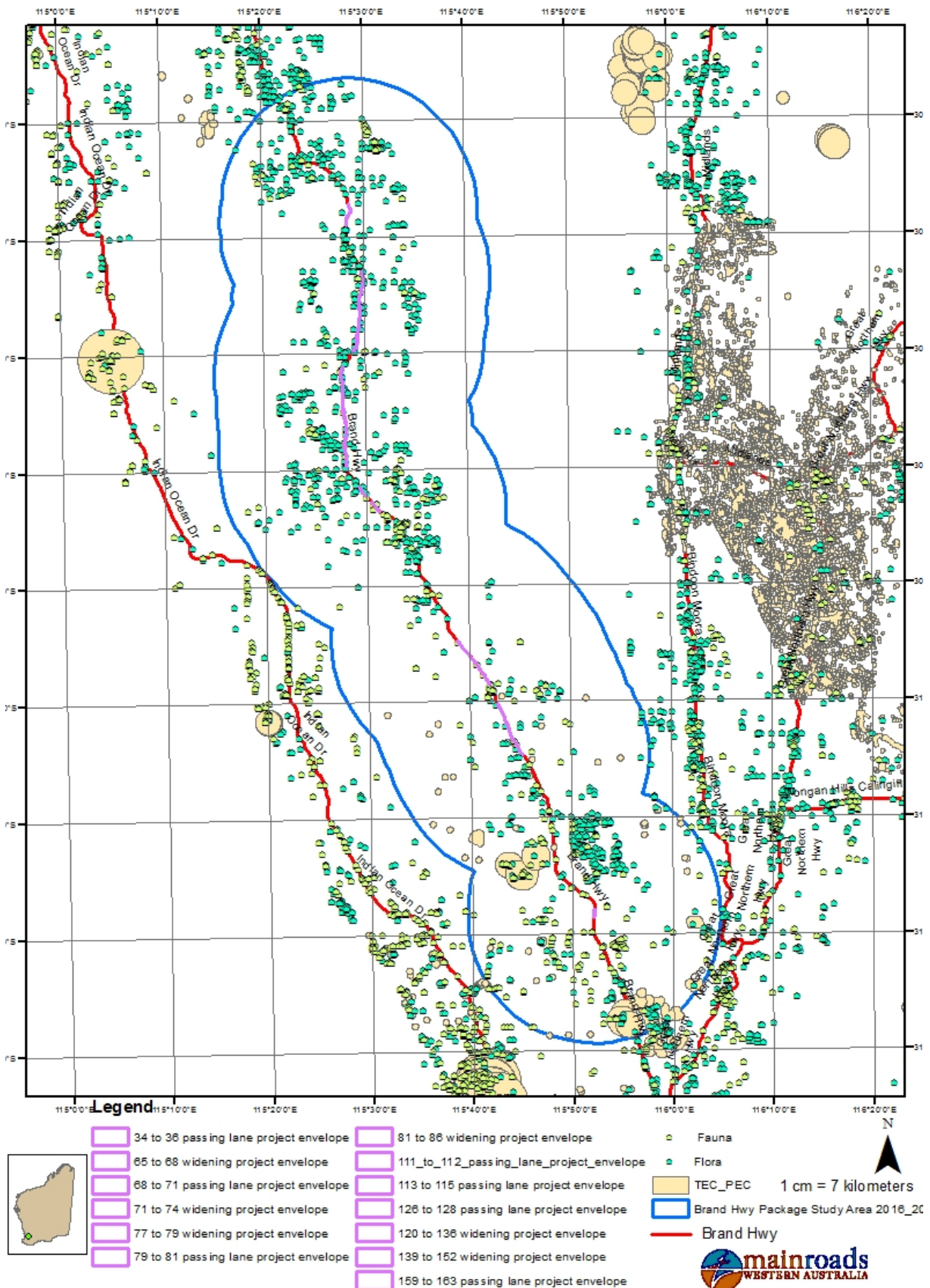


Photo 2 *Conostephium magnum* P4

No photograph of *Schoenus griffinianus* P4.

Appendix B

DPaW Threatened Flora and Fauna Database Searches



Appendix C

Vegetation Management Plan

Brand Hwy Package 2016-2017

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 |
|--|---|---|---------------------------------------|---|
| <i>Standard Vegetation Clearing and Fauna Management</i> | | | | |
| Avoid and manage project clearing | <ul style="list-style-type: none"> 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. |
| | <ul style="list-style-type: none"> 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 |
| | <ul style="list-style-type: none"> Have on site a copy of the ECD. | One compliance inspection will occur prior to clearing. | Project Manager / Environment Officer | Prior to clearing commencing |
| | <ul style="list-style-type: none"> All vegetation proposed to be cleared will be demarcated on site prior to the commencement of project activities. 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 |
| | <ul style="list-style-type: none"> 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 |
| | <ul style="list-style-type: none"> 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 |
| | <ul style="list-style-type: none"> 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 |
| | <ul style="list-style-type: none"> 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 Assistant 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. |

VEGETATION MANAGEMENT PLAN

| Project Component | Management Action | Monitoring/Maintenance Program | Responsible Person | Completion Timeframe |
|---|---|---|---------------------------------------|---|
| | 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 | <ul style="list-style-type: none"> An Environment Assistant 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 Assistant 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 Assistant 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. |
| | All riparian vegetation proposed to be cleared will be demarcated on site prior to the commencement of project activities. | 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. |
| | All damage caused (beyond the extent of approvals) during the construction to riparian vegetation habitat shall be rehabilitated to the pre-clearing condition. | | | |
| Principle (h) – Conservation estate | <p>Implement weed hygiene and control measures to prevent new weed infestations from occurring within the project area and the spread of existing weeds.</p> <p>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.</p> <p>Clean earth moving machinery of soil and vegetation prior to entry and exit to project areas adjacent to conservation areas.</p> | 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 |

VEGETATION MANAGEMENT PLAN

| Project Component | Management Action | Monitoring/Maintenance Program | Responsible Person | Completion Timeframe |
|---|--|---|---------------------------|---|
| Dieback and weed management. | <ul style="list-style-type: none"> • 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. | Machinery checked prior to entering project site adjacent to conservation areas. | Project Manager | Project lifespan/ ongoing |
| Weed Control | <ul style="list-style-type: none"> • 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 |
| <i>Standard Record Keeping Management</i> | | | | |
| Record Keeping - Clearing | Maintain the following records for the areas cleared: <ul style="list-style-type: none"> • 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. |
| Record Keeping – OP | Maintain the following records for the offset area: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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. |