ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN
Indian Ocean Drive SLK 235.75 to 240.20

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EXECUTIVE SUMMARY

The gap in Indian Ocean Drive from Lancelin to Cervantes has now been completed. This link now provides a continuous road from the North West suburbs of Perth to Brand Highway south of Dongara along the coast. This is a significant change to the network in this area has already stimulated significant changes to traffic volumes.

An improvement strategy for the existing route north of Leeman has been developed with the majority of the works bringing the formation width to 11m with a 9m seal. The first proposed project is from SLK 235.75 to 240.2 will involve the following:

- Reconstruct alignment to improve the alignment of 6 horizontal curves and 4 crest curves; and
- Widening of the formation to a width of 11m with a 9m seal;
- Clearing of approximately 8ha of native vegetation.

This project will be separated into two stages over two financial years. Stage one will be from SLK 235.75 to 237.20 in March 2011, while Stage Two is proposed to be from 237.20 to 240.2 and will be October / November 2011.

The construction will be done under traffic with no sidetracks and will utilise cut/fill method of construction.

The material is to be contractor supplied.

The proposed clearing of approximately 8ha and as such under CPS 818/5 a PEIA was undertaken. The outcome of the PEIA was that the project was likely to be at variance with principle a - due to several locations of priority flora proposed to be removed.

A Biological Survey was conducted in September 2009, the results of which were referred to in the PEIA.

The results of the survey concluded that:

- Three vegetation units were recorded in the Northern Survey Area:
    - *Acacia rostellifera, Melaleuca cardiophylla* shrublands on sandy soils;
    - *Acacia lasiocarpa, Melaleuca systena* low heath on limestone; and
    - Cleared / Degraded roadside (road maintenance zone).
- The vegetation types classified during the field survey were extrapolated and found matched with the vegetation associations indicated in Table 2. As such, the vegetation within the Northern Survey Area is considered to be of *Least Concern.*
- Vegetation condition throughout a majority of the Project Area was rated Condition 3 (*Very Good*) to Condition 2 (*Excellent*). The centre of the Northern Survey Area is highly disturbed, due to the construction and maintenance of the Indian Ocean Drive. Weed species were commonly recorded.
- No evidence of Dieback was observed within the Northern Survey Area. No flora species present within the Northern Survey Area are considered to be susceptible to the impact of Dieback.
- The vegetation units identified during the time of survey are not considered to represent any Threatened or Priority Ecological Community.
- A total of four Priority Flora taxa were recorded from the Northern Survey Area, three
- Priority 3 taxa, and one Priority 4 taxon:
    - *Beyeria cinerea* subsp. *cinerea* (P3);
    - *Haloragis foliosa* (P3);
    - *Stylidium maritimum* (P3); and

    - *Grevillea olivacea* (P4).
- No plants Declared under the *Agricultural and Related Resources Act* (1976) were recorded in the Northern Survey Area.
- Clearing of vegetation in the Project Area is considered to have minimal impact on fauna species, as no species are thought to use the Project Area exclusively. It is not considered that the clearing of vegetation will significantly alter the fauna habitat of the region. Disturbance is most likely to occur on a local scale, impacting individual animals, rather than a species. The Project Area is wholly surrounded by similar continuous vegetation, with grazing pressures altering the vegetation type from its pre-European state. The Project Area does not contain significant habitat for fauna species.

No environmental impacts identified during the preparation of this EIA and EMP are considered to warrant the referral of the Project to the Commonwealth Minister for Environment under the provision of the *Environmental Protection and Biodiversity Conservation Act, 1999*, or the *West Australian Environmental Protection Act 1986.*

1. INTRODUCTION

1.1 Background

A desktop Preliminary Environmental Impact Assessment (PEIA) has been completed for the proposed project.

A biological survey was also conducted in conjunction with the PEIA. Both assessments indicated that the proposed clearing may be at variance with one or more of the clearing principles.

Where the outcome of the PEIA indicated that the proposed clearing 'may be at variance or seriously at variance with one or more of the clearing principals', Main Roads must undertake an EIA.

This EIA and EMP has been prepared as a result of the PEIA findings for the Site, which indicated that the proposed clearing may be at variance with one or more of the 'Ten Clearing Principles' outlined in Schedule 5 of the Environmental Protection Amendment Act 2003.

1.2 Site Location

The location and boundaries of the study area are shown on Figures 1 & 2.

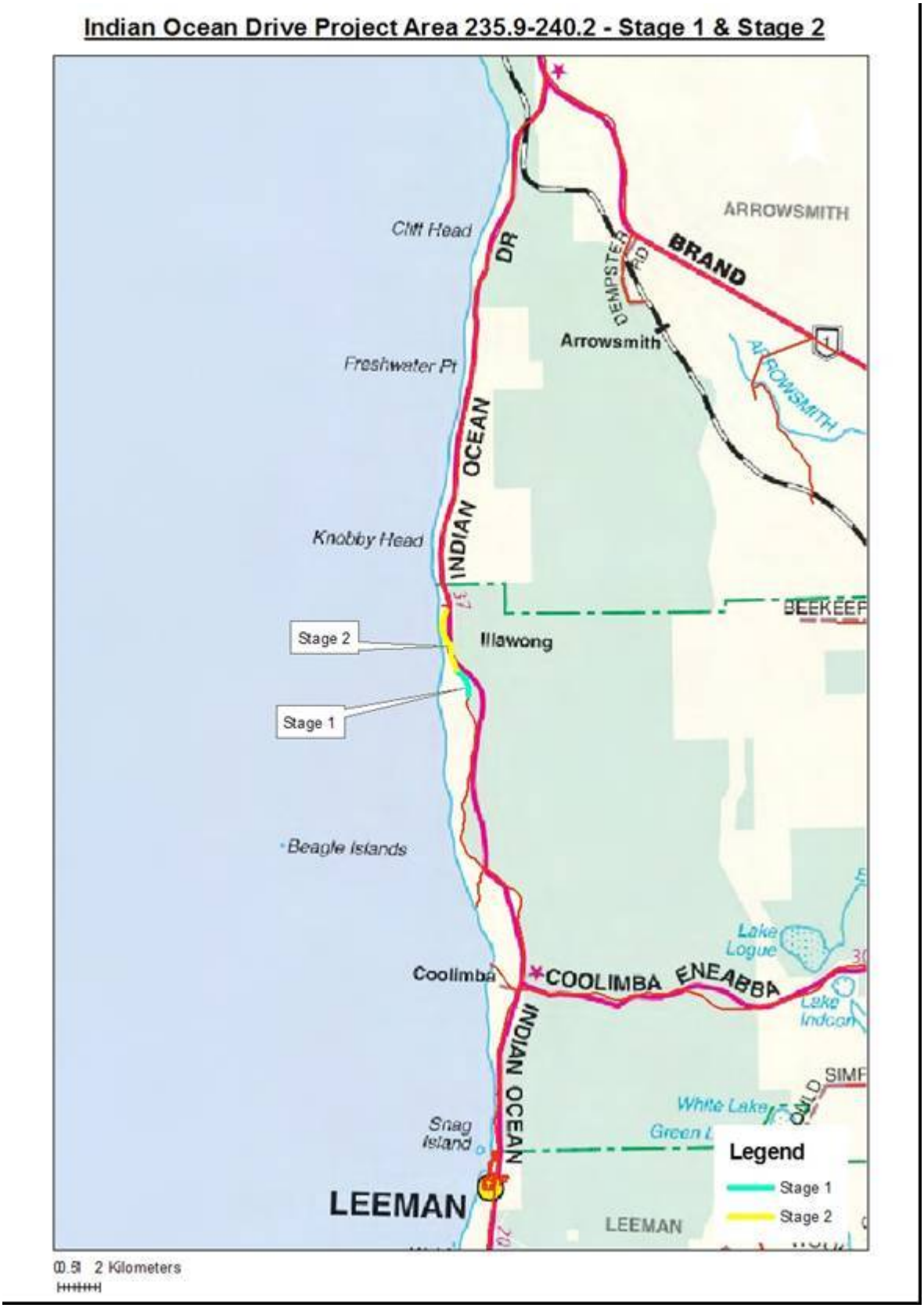

Figure 1: Location of Proposed Works

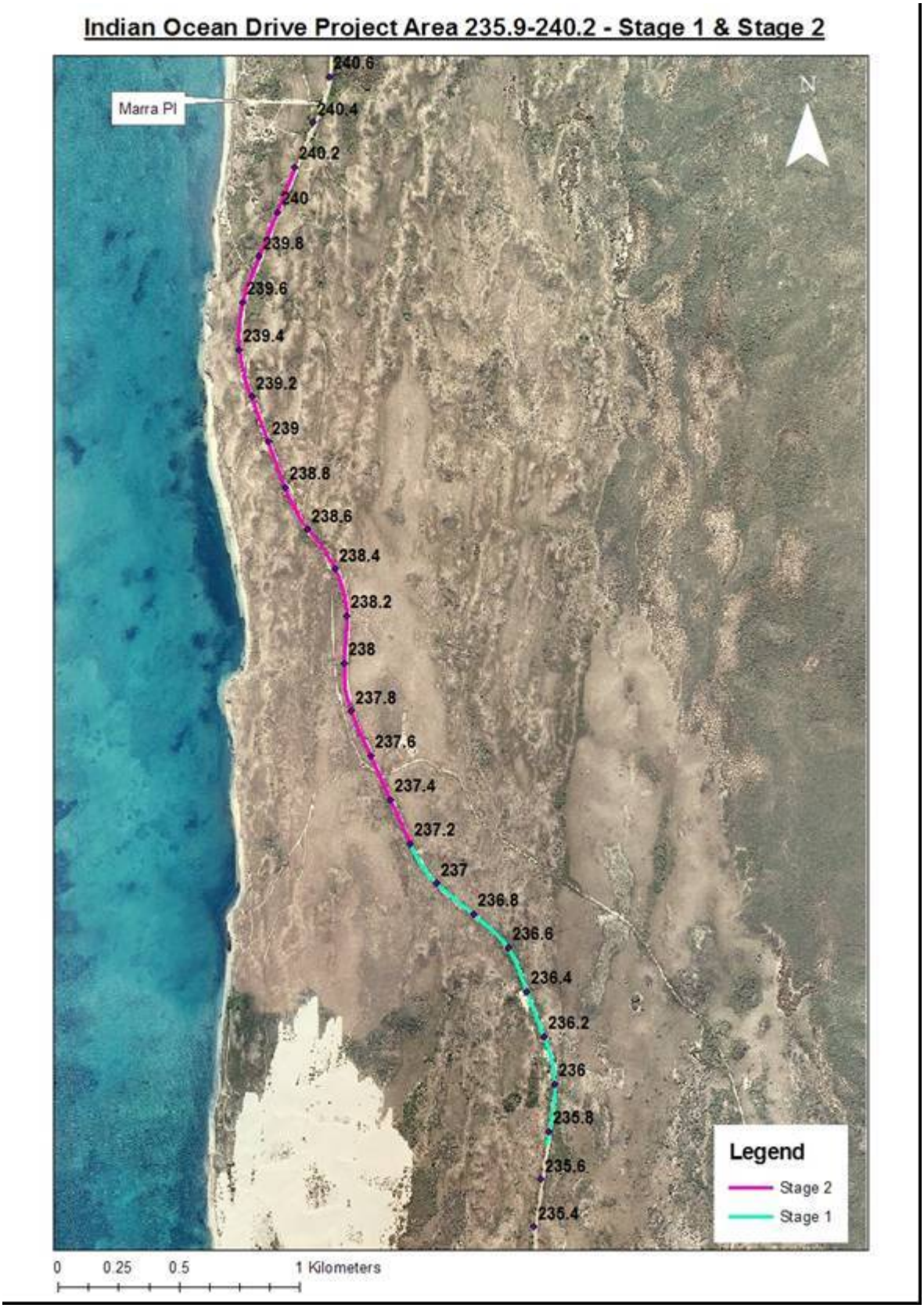

Figure 2: Location of Proposed Works

1.3 FIELD SURVEY SCOPE

Suitably qualified GHD Ecologists undertook a flora and vegetation survey on the 16th and 8th of October 2009, with reference to the Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia – Guidance Statement No. 51, EPA, Perth.

The flora survey was undertaken according to the following process (Source: GHD Pty Ltd 2009):
The Survey Areas are located as follows:

- The survey area was a 20 m wide corridor from either edge of Indian Ocean Drive between 15.58 and 17.90 km north of the Eneabba-Coolimba Road Intersection;
- The vegetation types and their boundaries were delineated, recording vegetation composition, condition rating, weed species and evidence of disturbance;
- Vegetation was rated according to the Bush Forever vegetation condition scale (Government of Western Australia, 2000);
- The presence of potential Threatened Ecological Communities (TECs) in the area was assessed;
- A search of the Department of Environment and Conservation's (DEC) Declared Rare and Priority Flora database and the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool was undertaken to identify expected significant flora for the area;
- Suitable habitat for Declared Rare and Priority Flora species was searched during the survey to determine the presence of previously recorded and unrecorded threatened flora; and
- Where field identification of plant taxa was not possible, specimens were collected in a systematic manner so that they could be later identified at the West Australian Herbarium by comparison with the reference collection and use of identification keys. Nomenclature of the species follows that of *FloraBase* (2008).

The reconnaissance fauna survey for the presence of fauna was conducted concurrently with the flora survey. A fauna habitat assessment was undertaken within each of the Project Sites. Nomenclature of the species follows that of *FaunaBase* (2008). The fauna survey was limited to terrestrial and vertebrate species.

The field survey included the following with regards to wetlands and drainage:

- An assessment and description of existing drainage patterns with respect to topography, and to flora and fauna communities; and
- An inventory and brief description of wetlands in the Project area, and their conservation value.

1.4 Purpose of this Document

This document describes the significant aspects of the existing natural and social environment at the Site and examines the environmental and social impacts of the proposed works.

Actions to manage and minimise the identified impacts have been proposed and incorporated as part of this document with the objective to develop an effective EMP that can be utilised during all phases of the project.

The EIA and EMP have been prepared based on:

- A field based biological survey;
- A review of relevant design documents prepared for the Project;
- Discussions with the MRWA Senior Project Manager; and
- Discussions with officers of the Department of Environment and Conservation.

2. PROJECT DETAILS

The proposed works involve the reconstruction of 4.45km of Indian Ocean Drive to bring the road up to 110km/h standard. The works include:

- Reconstruct alignment to improve the alignment of 6 horizontal curves and 4 crest curves.
- Widening of the formation to a width of 11m with a 9m seal.

3. EXISTING ENVIRONMENT

3.1 Climate

The climate of the Project Area is best described as Mediterranean, characterised by hot dry summers and mild wet winters. The closest Bureau of Meteorology station located to the Project Area is at Eneabba. Recorded climatic data for this weather station is summarised as follows:

» Mean Maximum Temperature: 36.1°C (February) to 19.6°C (July)
» Mean Minimum Temperature: 19.5°C (February) to 9°C (August)
» Mean Annual Rainfall: 503.7 mm
» Mean Annual Rain Days: 60.5 days
» Highest Recorded Daily Rainfall 78.4 mm (7 February 2008)
» Highest Monthly Rainfall 280.2 mm (June 1964)

Source: Bureau of Meteorology (2009)

(Source: GHD Pty Ltd 2009, Section 3.1)

3.2 Geology and Soils

According to the Geological Survey of Western Australia the geology of the Project Area is likely to be Safety Bay Sands, calcareous aeolian beach sand which is weakly lithified in places. The Northern Survey Area is also likely to contain aeolian coastal limestone and kankar (Lowry *et al*. 1969).

(Source: GHD Pty Ltd 2009, Section 3.2)

3.3 Rivers and Wetlands

Surface waters in the vicinity of the Survey Areas generally flow into sand dunes or small saline lakes which run parallel to the coast. No major rivers or wetlands occur in the vicinity of the Survey Areas, which are much closer to the coast (less than 1 km).
(Source: GHD Pty Ltd 2009, Section 3.3)

3.4 Public Drinking Water Supply Areas

The Survey Area is not located within any Public Drinking Water Catchment Areas.
The nearest water source areas are:

» Leeman Midway Bore Water Reserve, 5 km south east of the southern Survey Area; and
» Eneabba Water Reserve, 35 km east of the Survey Areas (Department of Water, 2009).

(Source: GHD Pty Ltd 2009, Section 3.4)

3.5 Land Use

The Survey Areas (northern and southern) are not situated within any conservation reserves. Beekeepers Nature Reserve, which is listed on the Register of National Estate, is situated immediately to the east of the road reserve at both Survey Areas. Beekeepers Nature Reserve covers an area of approximately 48,000 ha of coastal plain dominated by heath.

(Source: GHD Pty Ltd 2009, Section 3.5)

3.6 Reserves and Conservation Areas

Refer to section 3.5
(Source: GHD Pty Ltd 2009, Section 3.6)

3.7 Environmentally Sensitive Areas

No ESAs are located within the Survey Area. An ESA covers a large proportion of Beekeepers nature reserve. This ESA is situated approximately 100 m east of the northern Survey Area and approximately 3.8 km east of the southern Survey Area.

(Source: GHD Pty Ltd 2009, Section 3.6.1)

3.8 Contaminated Sites

Given the relatively superficial nature of the required earthworks, there appears to be a low risk of any significant contamination issues.

The works is within the road reserve and no known previous land use activities on or adjacent to the project area have had the potential to create contamination, e.g. petrol station.

(Source: MRWA 2009)

3.9 Flora and Vegetation

3.9.1 Vegetation Units

- Three vegetation units were recorded in the Northern Survey Area:
    - *Acacia rostellifera, Melaleuca cardiophylla* shrublands on sandy soils;
    - *Acacia lasiocarpa, Melaleuca systena* low heath on limestone; and
    - Cleared / Degraded roadside (road maintenance zone).
- The vegetation types classified during the field survey were extrapolated and found matched with the vegetation associations indicated in Table 2. As such, the vegetation within the Northern Survey Area is considered to be of *Least Concern.*
- Vegetation condition throughout a majority of the Project Area was rated Condition 3 (*Very Good*) to Condition 2 (*Excellent*). The centre of the Northern Survey Area is highly disturbed, due to the construction and maintenance of the Indian Ocean Drive. Weed species were commonly recorded.

(Source: GHD Pty Ltd 2009, Section 5.3)

3.9.2 Priority / Threatened Ecological Communities

The vegetation units identified during the time of survey are not considered to represent any Threatened or Priority Ecological Community.

(Source: GHD Pty Ltd 2009, Section 4.2.2)

3.9.3 Vegetation Condition

The vegetation in the Project Area was given a condition rating based on the Bush Forever Volume 2 vegetation condition ratings scale (Keighery, 1994).
The ratings in this scale are described in Table 15, Appendix A.
Vegetation condition throughout a majority of the Project Area was rated Condition 3 (*Very Good*) to Condition 2 (*Excellent*). The centre of the Northern Survey Area is highly disturbed,

due to the construction and maintenance of the Indian Ocean Drive. Weed species were commonly recorded.
(Source: GHD Pty Ltd 2009, Section 5.5.3)

3.9.4 Protected Flora Species

A total of four Priority Flora taxa were recorded from the Northern Survey Area, three Priority 3 taxa, and one Priority 4 taxon:
» *Beyeria cinerea* subsp. *cinerea* (P3);
» *Haloragis foliosa* (P3);
» *Stylidium maritimum* (P3); and
» *Grevillea olivacea* (P4).

(Source: GHD Pty Ltd 2009, Section 5.4.1)

3.9.5 Locally Significant Flora Species

A number of other significant flora taxa were recorded from the Northern Survey Area, including species recorded beyond their known range, and one taxon considered to be locally significant.

» *Pelargonium littorale* (Range Extension);
» *Stylidium junceum* (Range Extension); and
» *Hemigenia* sp. (identification uncertain) (Locally Significant).

(Source: GHD Pty Ltd 2009, Section 5.4.2)

3.9.6 Weed Species

A total of 21 weed species and one planted ornamental species were recorded from the Southern Survey Area. Weed species were dominated by grasses (Poaceae) and daisies (Asteraceae). All weeds from the Northern Survey Area are considered to be relatively commonly recorded from road maintenance zones.

Weeds of National Significance
No plant listed as Weeds of National Significance (WONS) were recorded in the Northern Survey Area.

Declared Plants (DP)
No plants Declared under the *Agricultural and Related Resources Act* (1976) were recorded in the Northern Survey Area.

(Source: GHD Pty Ltd 2009, Section 5.4.3)

3.9.7 Plant Pests and Diseases

No evidence of Dieback was observed within the Northern Survey Area. No flora species present within the Northern Survey Area are considered to be susceptible to the impact of Dieback.

(Source: GHD Pty Ltd 2009)

3.10 Fauna

3.10.1 Fauna Species

The reconnaissance fauna survey recorded 7 bird species, 2 mammals, and 2 reptile fauna taxa within the Northern Survey Area.

No threatened fauna species were recorded during the field survey. Two EPBC Act listed Migratory and Marine species were recorded from the Northern Survey Area. These species are not considered to be under threat in
Western Australia.
(Source: GHD Pty Ltd 2009, Section 5.5.2 and Table 18 Appendix B)

3.10.2 Habitat Types and Habitat Linkages

Three main habitat types were identified within the Northern Survey Area – Mixed Shrublands, Low Heath and Cleared/Degraded areas.

Based on the field survey, minimal habitat exists for fauna species in the Northern Survey Area, due to the proximity to Indian Ocean Drive. Some habitat exists for bird species in the shrublands present, but minimal leaf litter occurs for reptile species.
The vegetation types located in the Northern Survey Area are common for the local area and similar fauna habitat exists in the areas surrounding the Project Area.
(Source: GHD Pty Ltd 2009, Section 5.5.3)

3.10.3 Threatened Fauna

The desktop assessment indicated that a number of protected fauna may occur within the Project Area (refer to Section 3.10).

The habitat requirements of these species and the likelihood of their occurrence in the Project Area (with information from the field survey) are considered in Section 4.5.4.

A number of Migratory and/or Marine species, protected under the *EPBC Act,* may occur in the Project Area. Most migratory species, if occurring in the area, will be present as foraging species during the winter. Many of these migratory species are considered common in Western Australia and do not have special protection under the Western Australian *Wildlife Conservation Act 1950*.

(Source: GHD Pty Ltd 2009, Section 5.5.4 and 5.5.5)

3.10.4 Introduced Fauna

One introduced fauna species were recorded from the Northern Survey Area – the European Rabbit.
(Source: GHD Pty Ltd 2009, Section 5.5.6)

3.10.5 Fauna Impacts

Clearing of vegetation in the Project Area is considered to have minimal impact on fauna species, as no species are thought to use the Project Area exclusively. It is not considered that the clearing of vegetation will significantly alter the fauna habitat of the region. Disturbance is most likely to occur on a local scale, impacting individual animals, rather than a species. The Project Area is wholly surrounded by similar continuous vegetation, with grazing pressures altering the vegetation type from its pre- European state. The Project Area does not contain significant habitat for fauna
species.
Impacts are likely to occur to individual animals and include:

- Minor loss of habitat and feeding areas. This is not considered to be a substantial impact on current extent of habitat. There will be a minor loss of refuge vegetation and associated foraging resources; and
- Harm/deaths/displacement of individual animals. This may occur during clearing or
construction activities.

(Source: GHD Pty Ltd 2009, Section 5.5.7)

4. SOCIAL ENVIRONMENT

4.1 Surrounding Land Use

The proposed works area is surrounded by:

- Reserve 42477 – Shire of Carnamah –Parklands and Recreation; and
- Reserve 24496 – Bee Keepers Reserve

(Source: MRWA PEIA 2010)

4.2 Aboriginal Heritage

A desktop Aboriginal Heritage Assessment has been conducted by Rory O'Connor in August 2010 on the proposed project area and noted the following:
"This report therefore concludes that there is unlikely to be any additional information relating to the aboriginal heritage of that area available and that the works proceed as planned."
(Source: MRWA PEIA 2010)

4.3 European Heritage

A search of the Australian Heritage Places Inventory, Heritage Council of Western Australia and the Shire of Carnamah's Municipal Heritage Inventory on-line databases has indicated that there are no heritage significance listed sites present in the currently proposed works areas.

No Matters of National Environmental Significance will be impacted.

(Source: MRWA PEIA 2010)

5. ENVIRONMENTAL ASPECTS

The Environmental Aspects considered for this project are listed below. The table details those that required further investigation and management measures. Those items have been further documented in Sections 5.1 – 5.12.

Table 1: Environmental Aspects Considered for the Project

Environmental Aspect	Yes	No	Comments
Air Quality		X	Lack of emission sources therefore no impact on regional air quality.
Dust	X		Addressed in EMP Section 17 & 18
Vegetation – threatened species and communities	X		Addressed in EMP Section 14
Vegetation – clearing	X		Addressed in EMP Section 7, 12 & 13
Vegetation – dieback & other diseases or pathogens		X	Addressed in EMP Section 8, 9 &14.
Vegetation – weeds	X		Addressed in EMP Section 8, 9 &14.
European Heritage		X	No sites of European Heritage identified within the Site.
Aboriginal Heritage		X	No sites of Aboriginal Heritage identified within the Site.
Surface Waters / Drainage		X	Addressed in EMP Section 11.

Public Drinking Water Source Areas (PDWSA)		X	Site not located within a PDWSA.
Ground Water		X	Addressed in EMP Section 4.
Wetlands		X	No actual wetlands occur on site.
Noise & Vibration		X	Lack of sensitive receptors within the area.
Visual Impacts		X	Minimal impact due to the remote location of the Site and the fact that a road already exists in the location.
Public Safety & Risk	X		Addressed in EMP Section 31
Contaminated Sites		X	No contaminated sites identified within the site.
Acid Sulphate Soil		X	As the roadworks associated with the Project are not expected to require deep excavation, it is considered unlikely that Acid Sulphate Soils will be encountered during the project.
Hydrocarbon & Chemical Storage	X		No large quantities are to be stored onsite, but management measures have been addressed in Section 25 & 26.
Reserves & Conservation Areas	X		Addressed in EMP Section 14

5.1 Environmental Impacts and Management

Those issues considered relevant for further assessment as identified in Table 1 are discussed below, with a summary of the environmental and social impacts and management measures are detailed in the Environmental Management Plan (EMP) located in Appendix B.

5.2 Flora and Vegetation

Main Roads Western Australia (MRWA) has been issued with a statewide vegetation clearing permit (Purpose Permit CPS 818/4), granted under section 51E of the Environmental Protection Act (1986). The Purpose Permit allows MRWA to clear native vegetation for the road realignment projects and associated construction activities. Any clearing of native vegetation must be assessed against the 'Ten Clearing Principles' outlined in the permit.

The permit holder should engage in activities that minimise the amount of vegetation to be cleared and where clearing is assessed as being at variance with one or more of the 'Ten Clearing Principles', then the permit holder must implement an offset in accordance with Part V of the Permit with respect to that native vegetation.

The Purpose Permit requires that MRWA adhere to internal environmental processes as set out in Document Number 6707-001 'Environmental Assessment and Approvals', to ensure that they comply with the requirements of the Permit.

Table 2: Assessment against the 'Ten Clearing Principles'

MRWA Vegetation Clearing Assessment Report

This report has been prepared to assist MRWA in addressing condition 7 "Assessment of Clearing Impacts" under Clearing Permit CPS 818/3.

For guidance on how to complete the form, refer to DEC completed reports (active permits) at http://203.20.251.100/cps_reports/.

AREA UNDER ASSESSMENT DETAILS

Proponent details

Proponent's name: **MRWA**

Contacts:

Name:	Anna Sutherland
Phone:	99 56 1207
Fax:	99 56 1240
Email:	anna.sutherland@mainroads.wa.gov.au

Property details

Property: Indian Ocean Drive SLK 235.75 to 240.2

Colloquial name:

Area under assessment

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:	Site Plan Attached
8	0	Mechanical	Road Realignment	☐ Yes

Avoidance/Minimise clearing

How have the clearing impacts been minimised?

BACKGROUND

Existing environment and information

Description of the native vegetation under application

(suggestion: To determine Vegetation Condition use - Keighery, B.J. (1994) Bushland Plant Survey: A Guide to Plant Community Survey for the Community. Wildflower Society of WA (Inc). Nedlands, Western Australia.)

Site Visit Undertaken	☐ Yes	**Fauna / Flora Survey Undertaken**	☐ Yes
Site Report Attached	☐ Yes	**Fauna / Flora Survey Report Attached**	☐ Yes
Site Photos Attached	☐ Yes	**Other Relevant References Attached**	☐ No

Vegetation Complex	Clearing Description	Vegetation Condition	Comment
1026 Mosaic: Shrublands; Acacia rostellifera, Melaleuca cardiophylla thicket / shrublands; Acacia lasiocarpa and Melaleuca acerosa heath.	Mechanical	Degraded to Excellent	

ASSESSMENT OF APPLICATION AGAINST CLEARING PRINCIPLES

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

Comments **Proposal is likely at variance to this Principle**

Methodology GHD Biological survey states that based on findings of the report, the clearing is likely to be at variance with principle a of the DEC's ten clearing principles, due to several locations of priority flora proposed to be removed.

(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 **Proposal is at not variance to this Principle**

Methodology GHD Biological Survey

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

Comments **Proposal is at not variance to this Principle**

Methodology GHD Biological Survey

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

Comments **Proposal is not at variance to this Principle**

Methodology GHD Biological Survey

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

Comments **Proposal is not at variance to this Principle**

Methodology GHD Biological Survey

(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 **Proposal is not at variance to this Principle**

Methodology GHD Biological Survey

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

Comments **Proposal is not at variance to this Principle**

Methodology GHD Biological Survey

(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 **Proposal is not at variance to this Principle**

Methodology GHD Biological Survey. The proposed works are 50m away from Bee Keepers Reserve and will not impact upon the reserve.

(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 **Proposal is not at variance to this Principle**

Methodology GHD Biological Survey

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Comments **Proposal is not at variance to this Principle**

Methodology GHD Biological Survey

Planning instrument, Native Title, RIWI Act Licence, EP Act Licence, Works Approval, Previous EPA decision or other matter.

Comments Not applicable

Methodology

SUBMISSIONS

If required have submissions been requested and addressed

Submission Requested from	Request Sent (Date)	Submission Received (Date)	Issues Raised / Comments Made

ASSESSOR'S RECOMMENDATIONS

List of Principles seriously at variance, at variance or maybe at variance

Recommendation is an Offset Proposal and Environmental Management Plan.

References

OFFICER PREPARING REPORT

_____

Position: Anna Sutherland
Mid West Regional Office
MRWA
Phone: 99 56 1207

Date: 24/11/2010

The amount of clearing required for the project is at 8 hectares and it is considered likely to be at variance with principle a.

In accordance with Part V of clearing permit CPS 818/5, MRWA will be required to submit an appropriate offset proposal for any clearing that 'maybe at variance' or 'is at variance' with any of the clearing principles in Schedule 5 of the EP Act.

5.3 Disease Management

Field visits by the MRWA Environmental Officer noted that there were no dieback sensitive flora species are present within the works areas. Dieback was not considered an issue given the project area receives less than 400 mm (332.8mm) of average annual rainfall.

However vehicle hygiene is recommended prior, during and post construction works.

- Clean earth – moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
- Avoid the movement of soil in wet conditions;

- Restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

Management measures are included in the Environmental Management Plan provided as Appendix B.

5.4 Weed Management

Machinery and vehicles hygiene measures detailed in the Disease Management Section will avoid the inadvertent spread of weeds throughout the site, and from other sites. Management for this project will also be undertaken in accordance with the MRWA clearing permit.

5.5 Fauna

Clearing of vegetation within the Project Site is considered to have minimal impact on fauna species, as no species are thought to use the Project Site exclusively. It is not considered that the clearing of vegetation will significantly alter the fauna habitat of the region.

Impacts are likely to occur to individual animals and include:

- Minor loss of habitat and feeding areas. This is not considered to be a substantial impact on current extent of habitat. There will be a minor loss of refuge vegetation and associated foraging resources;
- Harm/deaths/displacement of individual animals. This may occur during clearing or construction activities.

GHD recommended land acquisition and rehabilitation be undertaken to increase the width of the road reserve in areas that are being cleared so that there is no net loss of habitat and to compensate for loss of fauna habitat.

5.6 Drainage

No wetlands or rivers are present at the Project Site.

The project site does contain a culvert, which will be extended to allow for the extra road width.

The proposed works will not alter the flow or direction of water through this culvert.

5.7 Ground Water

The Shire of Perenjori is responsible for the supply and delivery of water required for the Project. The Construction Contractor (subject to the approval of the Superintendent) is also responsible for ensuring that all water abstraction and use is licensed and all approvals have been obtained.

5.8 Dust

There is likely to be some dust lift generated during the construction works and from passing traffic, which has the potential to settle on and cause impacts to adjacent vegetation. During construction, regular watering of the road will be undertaken to ensure the base material is at or near the Optimum Moisture Content to achieve sufficient compaction levels. This will assist in reducing dust generation.

The Shire of Perenjori will provide for the management of dust such as watering of the works area and other areas immediately adjacent to the works as required.

5.9 Aboriginal Heritage

MRWA and their contractors need to be aware of their obligations under the *Aboriginal Heritage Act 1972* during the road construction.

If during roadworks, the Shire of Perenjori, uncovers any materials that could be considered significant to Aboriginal people, works will immediately cease within 50m of the material and the DIA and police will be notified immediately.

5.10 Public Safety

To ensure the safe access of traffic throughout the site during construction, the Shire of Perenjori will develop and implement a Traffic Management Plan, congruent with the requirements detailed on the MRWA website.

All traffic control measures will be in place and fully operational before the Shire of Perenjori commences any work activity that affects the existing roadways.

5.11 Fire Management

The Shire of Perenjori will conform to any specific requirements for fire prevention requested by MRWA, DEC and/or FESA.

During road construction, the following fire management requirements will be complied with:

- Machines and vehicles will be restricted to designated cleared areas;
- All plant and vehicles operating over vegetation will have exhaust systems in good working order;
- All machinery will shut down during periods of extreme fire hazard as advised by the DEC;
- All machinery will be fitted with fire extinguishers;
- Smoking on site will be controlled and all cigarettes will be disposed of in an appropriate vessel;
- All glass (and other wastes) will be collected and removed off site on a daily basis.

5.12 Hydrocarbon and Chemical Storage

No on-site storage of fuel, oils and other contaminant materials will be permitted during road construction. Equipment required for the cleanup of any accidental spillages will be maintained on-site.

Major vehicle and plant servicing will be not be conducted on-site.

5.13 Waste Management

All domestic and other rubbish will be disposed of on a daily basis. Final disposal of all wastes will be to an authorised offsite waste disposal site or an agreed site with the Shire of Perenjori.

6. ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) for this project is presented in Appendix B. The EMP presents commitments and management measures that MRWA and the approved contractor will implement to ensure the project is environmentally responsible.

The EMP details the aspect, management strategies, responsible officer and the project stage the strategies are to be taken.

6.1 Environmental Monitoring and Compliance

All MRWA employees and the approved contractors employees and other personnel employed on the Project will be made aware of the EMP through the site induction process.

During the projects construction phase, compliance with the environmental management measures will be regularly monitored.

All incidents will be managed in accordance with the MRWA Environmental Incident Reporting and Investigation Guideline.

6.2 Environmental Management and Quality Plan

The Shire of Perenjori shall develop a Contractor's Environmental Management Plan, as detailed in Spec 204, and will address the management strategies which have been assigned to them in the EMP.

7. CONSULTATION

Consultation was undertaken with the following parties, as part of the EIA process:

- Department of Environment and Conservation – Native Vegetation Conservation Office and Jurien Office;
- Rory O'Connor – Aboriginal Heritage;
- Northern Agricultural Catchments Council – Geraldton Office;
- – Department of Water – Geraldton Office;
- Office of the Commissioner of Soil and Land Conservation – Department of Agriculture and Food – Bentley Office; and
- CEO Shire of Carnamah.

8. CONCLUSIONS

The PEIA, Biological Survey and the results of this assessment concluded that:

- The project is likely to be at variance with one clearing principle a;
- An offset package will be required to be developed prior to any clearing being conducted (Refer to Appendix D for proposed offsets);
- Those threatened flora areas identified as not being impacted are not be disturbed by construction works.
- Other impacts of the proposed works can be managed through appropriate mitigation measures outlined in the Environmental Management Plan.

9. REFERENCES

GHD Pty Ltd (2009) *Indian Ocean Drive March 2009.*

Main Roads Western Australia (2009) *Preliminary Environmental Impact Assessment Indian Ocean Drive SLK 235.75 to 240.20.*

10. APPENDIX A – GHD PTY LTD – INDIAN OCEAN DRIVE 2009

11. APPENDIX B – ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan – INDIAN OCEAN DRIVE SLK 235.75 TO 240.20

Item No	Commitment	Expected Outcome	Responsibility	Timing
1	The proposed road realignment works be implemented in accordance with the environmental management measures detailed in this EIA and EMP.	All issues will be identified and managed to ensure minimal environmental impact.	Project Manger	All of Project
2	Environmental management measures detailed in this EMP will be included in relevant contract documents and Technical Specifications prepared for the project.	The contractor undertaking the construction will be aware of environmental concerns and their obligations, to ensure minimal environmental impact.	Project Manager	Pre -Construction
3	MRWA to obtain approved offset prior to clearing.	Compliance with CPS 818/5	Project Manager	Pre – Construction.
4	Approvals will be sought and conditions applied with, should ground water bore construction and abstraction be required.	Compliance with the *Rights in Water and Irrigation Act 1914.*	Project Manager	Pre - Construction
5	The Construction Contractor will prepare a Contractors Environmental Management Plan, as detailed in Spec 204, addressing the requirements detailed in this EMP.	Compliance to MRWA Environmental Assessment and Approvals Process.	Project Manager	Pre - Construction
6	The Contractor's Environmental Management Plan, will be approved by the MRWA Project Manager prior to construction.	Compliance to MRWA Environmental Assessment and Approvals Process.	Project Manager	Pre - Construction
7	The clearing line will be marked by the Construction Contractor and approved by the Project Manager prior to any clearing proceeding. Trees to be conserved will be marked with a different color to ensure they are not removed.	Minimise clearing impacts	Construction Contractor	Pre – Construction
8	Clean earth – moving machinery of soil and vegetation prior to entering and leaving the area to be cleared.	Minimise the risk of spread of weeds.	Project Manager and Construction Contractor.	Pre – Construction and Construction.
9	Any declared weeds on Site will be managed as required by the Agriculture and Related Resources Protection Act 1976.	Minimise the risk of spread of weeds.	Project Manager and Construction Contractor.	Pre – Construction and Construction.
10	Clearing of vegetation will be minimised to that which is practical for the safe construction and operation of the road (maximum of 8ha)	Minimise the impacts to fauna and fauna habitats.	Project Manager and Construction Contractor.	Pre – Construction and Construction.
11	Existing surface water flows are to be maintained by extending the existing crossroad culvert.	Maintain existing surface water movement.	Project Manger / Construction Contractor.	Design and Construction.
13	Trees to be removed will be felled in a manner that ensures they fall within the approved clearing area.	Minimise clearing impacts	Construction Contractor	Construction
14	Restrict the movement of machines and other vehicles to the limits of the areas to be cleared.	Minimise the risk of spread of weeds.	Project Manager and Construction Contractor.	Construction.

Item No	Commitment	Expected Outcome	Responsibility	Timing
15	Works will cease on sighting an animal in the construction site. Works will commence once the animal has moved on.	Minimise the impacts to fauna and fauna habitats.	Construction Contractor.	Construction.
16	The work will be left in a safe condition at the end of the working day to ensure that animals are not subject to harm from the site works.	Minimise the impacts to fauna and fauna habitats.	Construction Contractor.	Construction.
17	The Construction Contractor will employ construction methods that will keep dust lift to a minimum, and as required provide for the management of dust such as by watering of the works area and other areas adjacent to the works.	Dust lift will be minimised, minimising impacts to surrounding vegetation and reducing risks to the travelling public.	Construction Contractor.	Construction.
18	Where it is found that vehicles leaving the site have dropped excessive soil material onto adjacent sections of the Wubin Mullewa Road, these sections will be swept to reduce the potential for dust generation and maintain traffic safety.	Dust lift will be minimised, minimising impacts to surrounding vegetation and reducing risks to the travelling public.	Construction Contractor.	Construction.
19	Cleared vegetation suitable for the rehabilitation of any degraded locations on/or adjacent to the site will be re-used or otherwise appropriately disposed of.	Minimise clearing impacts	Construction Contractor	Construction/Post Construction
20	Environmental issues and management measures will be included in site inductions for MRWA staff and contract staff.	The staff involved with the project will be aware of their environmental concerns and their obligations, to ensure minimal environmental impact.	Project Manger	All of Project
21	No vegetation is to be disturbed for set down areas, spoil sites or site offices. Vehicles and equipment will be not be parked or driven over tree roots.	Minimise clearing impacts	Construction Contractor	All of Project
22	No burning is permitted within the Project Area.	No fires occur as a result of the Project.	Construction Contractor	All of project
23	Machines and vehicles will be restricted to designated cleared areas,	Reduce the fire risk as a result of the Project.	Construction Contractor	All of project
24	The Construction Contractor will conform to any specific requirements for fire prevention requested by MRWA, DEC and / or FESA.	Comply with local fire management requirements.	Construction Contractor	All of project
25	No storage of large quantities of fuel, oils or chemicals within the Project Area. Spill containment equipment will be available in the event of a spill of minor fuels stored in vehicles and equipment.	No site contamination will occur as a result of this Project.	Construction Contractor.	All of Project.
26	Major vehicle and plant servicing will not be conducted on site.	No site contamination will occur as a result of this Project.	Construction Contractor.	All of Project.

Item No	Commitment	Expected Outcome	Responsibility	Timing
27	During road construction activities, the following fire management requirements will be complied with: • All plant and vehicles operating over vegetation will have exhaust systems in good working order. • All machinery will be shutdown in periods of extreme fire hazard as advised by the DEC or MRWA or FESA; • All machinery to be fitted with fire extinguishers; • Smoking on site will be controlled and all cigarettes will be disposed of in an appropriate vessel; • All glass (and other wastes) will be collected and removed off site on a daily basis.	Reduce the fire risk as a result of the Project.	Construction Contractor	All of project
28	All rubbish will be disposed of on a daily basis offsite for final disposal to an authorised waste disposal site.	Waste is disposed and contained of appropriately in order to prevent contamination of the environment.	Construction Contractor.	All of Project.
29	If during road works, any materials of significance to Aboriginal people are uncovered by the Construction Contractor, works will immediately cease within 50m of the material and the DIA notified as soon as practicable.	Aboriginal Heritage sites are not disturbed without appropriate approvals.	Project Manager and Construction Contractor.	All of Project
30	If skeletal material is uncovered during the works then the WA Police Service will be advised immediately.	Aboriginal Heritage sites are not disturbed without appropriate approvals.	Project Manager and Construction Contractor.	All of Project
31	Traffic Management Plan is developed and implemented in accordance with the requirements detailed on the MRWA Internet Site.	Maintain safe access for through traffic movements.	Construction Contractor	All of Project
32	During the project compliance with environmental management measures will be regularly monitored. All incidents are to be managed in accordance with the MRWA Environmental Incident Investigation and Reporting Guideline.	Compliance with this EMP and relevant legislation.	Project Manager and Construction Contractor.	All of Project
33	Any damage caused by the Construction Contractor to vegetation, landforms or fauna habitat outside the works area will be rehabilitated at the Contractor's cost.	Minimise clearing impacts	Construction Contractor	Post Construction

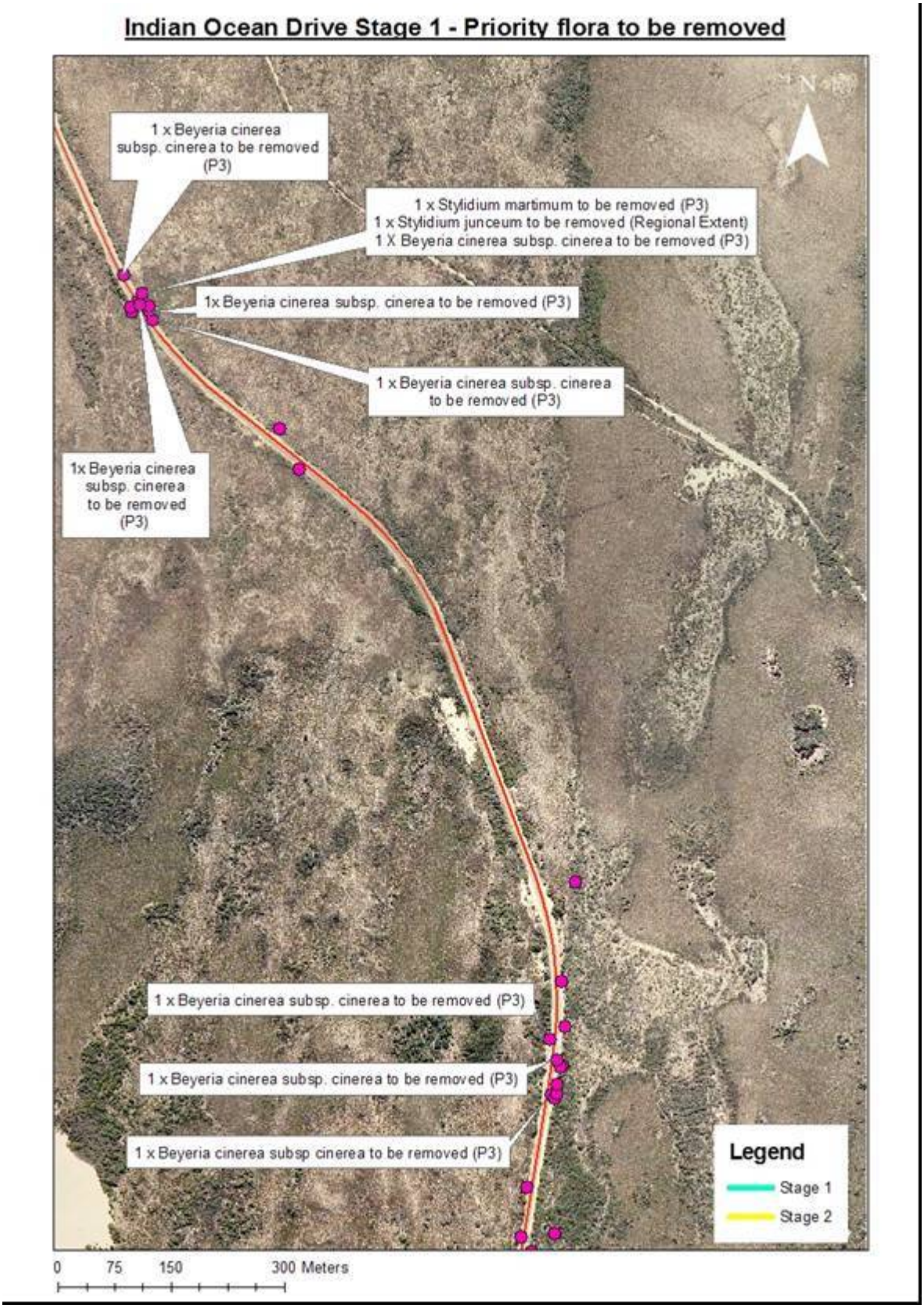

Figure 4: Location of priority species to be removed

12. APPENDIX D PROPOSED OFFSETS

TRIM Ref: D11#44009