

**Access Track to Nelson  
Location 7965  
(Sandy Peak)  
Doggerup Road  
Shire of Manjimup**

# **Public Environmental Review Assessment No 1836**



Prepared By:

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15<sup>th</sup> June 2012



**BIO  
DIVERSE  
SOLUTIONS**

### **Invitation to make a submission**

The Environmental Protection Authority (EPA) invites people to make a submission on this proposal. Both electronic and hard copy submissions are most welcome.

Shellbay Holdings Pty Ltd proposes to construct an all-weather access track along Doggerup Road from Windy harbour Road to Nelson Location7965. In accordance with the *Environmental Protection Act 1986* (EP Act), a Public Environmental Review (PER) has been prepared which describes this proposal and its likely effects on the environment. The PER is available for a public review period of 8 weeks from 2<sup>nd</sup> July 2012 closing on 27<sup>th</sup> August 2012.

Comments from government agencies and from the public will help the EPA to prepare an assessment report in which it will make recommendations to government.

### **Why write a submission?**

A submission is a way to provide information, express your opinion and put forward your suggested course of action - including any alternative approach. It is useful if you indicate any suggestions you have to improve the proposal. All submissions received by the EPA will be acknowledged. Submissions will be treated as public documents unless provided and received in confidence, subject to the requirements of the *Freedom of Information Act 1992* (FOI Act), and may be quoted in full or in part in the EPA's report.

### **Why not join a group?**

If you prefer not to write your own comments, it may be worthwhile joining a group interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group, as well as increase the pool of ideas and information. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

### **Developing a submission**

You may agree or disagree with, or comment on, the general issues discussed in the PER or the specific proposal. It helps if you give reasons for your conclusions, supported by relevant data. You may make an important contribution by suggesting ways to make the proposal more environmentally acceptable.

When making comments on specific elements of the PER:

- Clearly state your point of view;
- Indicate the source of your information or argument if this is applicable;
- Suggest recommendations, safeguards or alternatives.

### **Points to keep in mind**

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- Attempt to list points so that issues raised are clear. A summary of your submission is helpful;
- Refer each point to the appropriate section, chapter or recommendation in the PER;
- If you discuss different sections of the PER, keep them distinct and separate, so there is no confusion as to which section you are considering; and
- Attach any factual information you may wish to provide and give details of the source. Make sure your information is accurate.

Remember to include:

- Your name;
- Address;
- Date; and
- Whether and the reason why you want your submission to be confidential.

Information in submissions will be deemed public information unless a request for confidentiality of the submission is made in writing and accepted by the EPA. As a result, a copy of each submission will be provided to the proponent but the identity of private individuals will remain confidential to the EPA.

The closing date for submissions is: **Monday 27<sup>th</sup> August 2012**

The EPA prefers submissions on PER documents to be made electronically using one of the following:

- by email to: [submissions@epa.wa.gov.au](mailto:submissions@epa.wa.gov.au);
- by email to the officer **[leanne.thompson@epa.wa.gov.au](mailto:leanne.thompson@epa.wa.gov.au)**.

Alternatively, submissions can be:

- Posted to: Chairman, Environmental Protection Authority, Locked Bag 33, CLOISTERS SQUARE WA 6850, Attention: Leanne Thompson; or
- Delivered to the Environmental Protection Authority, Level 4, The Atrium, 168 St Georges Terrace, Perth, Attention: Leanne Thompson; or

If you have any questions on how to make a submission, please ring the EPA assessment officer, Leanne Thompson on 6467 5246.

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## **1. Executive Summary**

### **1.1. Description of Proposal**

Shellbay Holdings Pty Ltd (Proponent) proposes to construct an all-weather access track along a gazetted road reserve "Doggerup Road" between Windy Harbour Road and Nelson Location 7965 (known as Sandy Peak) on the south coast of Western Australia. Doggerup Road (Subject Site) is located between Windy harbour Road and Nelson Location 7965, within the Shire of Manjimup. Access to the private property is presently under permit via a seasonally opened management track (managed by the Department of Environment and Conservation). Nelson Location 7965 is owned by Shellbay Holdings Pty Ltd who propose to survey and construct the track at their own expense with the approval from the Shire of Manjimup.

The Gazetted Road - Doggerup Road is located within the municipality of the Shire of Manjimup and was gazetted and surveyed approximately 70 years ago when Location Nelson 7965 was freeholded. The Doggerup Road Reserve is legal and gazetted access for Nelson Location 7965. Nelson Location 7965 is a private property adjoining the south coast and is surrounded by D'Entrecasteaux National Park, with no formal year-round access via vehicle. Doggerup Road extends from Windy Harbour Road to Nelson Location 7965 for approximately 6.5 km, of which 1.5km was cleared by the Shire of Manjimup approximately 40 years ago.

### **1.2. History of the Project**

The project has a long history, with the proposal referred to the Environmental Protection Authority (EPA) by the Shire of Manjimup in April 1997. The EPA set the level of assessment at Public Environmental Review (PER) on 15 May 1997 due to concerns that the proposal would impact on the adjacent D'Entrecasteaux National Park, which is considered to be an Environmentally Sensitive Area (ESA).

A timeline of the history surrounding this project is summarised below:

- PER documents were submitted to the EPA in January 1998, the PER was available for public review for eight weeks, from 21 September 1998 to 13 November 1998. Thirteen submissions were received from government agencies, environmental groups and the public.
- Prior to the EPA completing its assessment and providing its report and recommendations to the then Minister for the Environment, and as a result of a misunderstanding between DEC and Shellbay Holdings Pty Ltd, they (Shellbay Holdings Pty Ltd) cleared a 5 metre wide access track along the full 6.5km length of the Doggerup Road Reserve from Windy Harbour to Nelson Location 7965.
- Legal proceedings followed and this led to Shellbay Holdings Pty Ltd subsequently withdrawing the PER proposal in December 2002.
- In 2009 the then Minister for the Environment determined that the proposal was unlikely to be Environmentally Acceptable due to environmental factors relevant to the proposal not satisfactory addressed in the PER.
- In October 2009 the Proponent appealed the decision by the Minister.
- Shellbay Holdings Pty Ltd continue to seek legal and secure access to the property and consequently referred a new PER proposal to construct an all-weather access track from Windy Harbour Road to Nelson Location 7965 within the gazetted road reserve.

The Minister for Environment determined the appeal for this proposal in May 2010, and upheld the appeal to the extent that the proposal be resubmitted to the EPA for a second time, with a more full and public assessment.



As a result of this determination, the Proponent is provided with the opportunity to:

- (1) *Investigate and document the environmental merits of alternative access routes to location 7965;*
- (2) *Clarify the proposal description, including: the disturbance area and width of the proposed road; the construction details of the Class three road; and the purpose of the road;*
- (3) *Undertake a review and update of the management plans, data and commitments in the previous documentation;*
- (4) *Collect site specific information pertaining to each environmental factor identified in the EPA's Statement of Reasons for Level of Assessment, which includes wetlands, dieback, native vegetation, Declared Rare Flora and Priority Flora, specially protected or priority Flora, soils and Aboriginal Culture; and*
- (5) *Demonstrate that the proposal can be developed and managed to be consistent with EPA policy.*

*(Minister for Environment letter dated 11/5/2010)*

Hence the above forms the basis for which this second Public Environmental Review (PER) document has been compiled and will provide the context for the EPA's Assessment.

### **1.3. Key Project Issues for Environmental Assessment**

In its Statement of Reasons Proposal Unlikely to be Acceptable dated 14 December 2009, the Environmental Protection Authority determined the key environmental factors relevant to the proposal as being:

- *Wetlands – Concerns that the proposed road would fragment the Doggerup Creek Wetland system and cause compaction and alteration of subsurface hydrology of these wetland areas.*
- *Dieback – The proposed road would have indirect impacts on wetland areas within the D'Entrecasteaux National Park through the spread of *Phytophthora cinnamomi* (dieback). The proposed road is very likely to have indirect impacts on poorly represented fragile plant communities in the vicinity of the proposed road through the spread of diseases such as *Phytophthora cinnamomi* (dieback).*
- *Native Vegetation – The proposal would reduce the extent of viable and intact native vegetation within four vegetation complexes of which only 15% of their original extent is currently in existing or proposed conservation reserves.*
- *Declared Rare and Priority Flora and Specially Protected or Priority Fauna - The proposed road may potentially disturb or destroy rare, priority or fragile flora species or communities and result in habitat loss, fragmentation and degradation and/or fatality for threatened and priority fauna through direct clearing, the spread of weeds, pests and pathogens, and potential fatality through construction and vehicles travelling at speed.*
- *Soil – The proposed road may result in soil erosion, degradation and acid sulphate soils event which would have serious implications for ecosystem integrity and biodiversity and management of the park more generally.*
- *Aboriginal Culture – A large number of registered sites under the Aboriginal Heritage Act are to be found within the Doggerup Creek area and there is a strong likelihood that further sites and artefacts of cultural significance exist in the area. These could be affected by the proposed road.*

The Proponent is addressing the following matters in this updated PER document:

- Environmental impacts during the construction and use of the roadway; and
- Indirect impacts of the track on D'Entrecasteaux National Park.

### **1.4. Potential Environmental Impacts and Proposed Management**

The Environmental Scoping Document (Bio Diverse Solutions 2011) identified a number of "Key Factors" relevant to the proposal.



## **Wetlands**

Natural Area Consulting (NAC) wetland specialists (2011) undertook a wetland assessment defining the wetlands as part of the Gardner Watershed catchment area. The potential impact area is considered small, some 1.4 ha or 0.055% of the area known as the Doggerup Creek System of wetlands, or 10.8% of the gazetted road reserve area.

The Subject Site has a moderate risk of having suitable habitat for the vulnerable Balston's Pygmy Perch (*Nannatherina balstoni*) (*Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act) and *Wildlife Conservation Act 1950* (WA) (WCWA)) and the Priority 3 species *Galaxiella nigrostriata* (Black-striped Minnow) (WCWA), as water conditions and geology are similar to those in other locations within the broader Doggerup Creek System where there are known populations of the fish.

It is anticipated there will be minimal long term disturbance to wetland areas and hydrological flows. Localised disturbance may occur to wetlands in the short term, with return to function in the long term as little vegetation will be disturbed, and aquatic fauna are able to move through the wetland areas.

No disturbance is proposed to the adjacent ESA wetland area, with disturbance confined to the road reserve area. Off-site impacts are anticipated to be low to the wider Gardner Watershed wetlands. The project is not anticipated to affect any groundwater resources.

Surface water monitoring indicates that the surface hydrology waters are rapidly draining with temporary pools forming during precipitation events. The extent of surface water cover in 2011 (wet winter season) compared with 2010 (un-seasonally dry winter) indicates that surface water (cover/extent) patterns are not variable between seasons. Monitoring pegs will guide the drainage of the track construction to ensure that drainage infrastructure is located in these areas to avoid any pooling or disruption to water flows across the Gardner watershed area.

## **Native Vegetation**

NAC flora specialists (2011) undertook spring and summer flora surveys within the road reserve. The vegetation types were mapped within the subject area, a total of 236 species were recorded in the survey area and 7 Vegetation units were described being: Ed: Tall Closed Forest, EmCc: Tall Open Forest, OH: Open Heath, Em Low Woodland, CTS: Wetland areas, Tf: Low Open Forest, BIBq Low open Woodland.

NAC found that none of the vegetation complexes traversed by the survey area are considered to be under threat (Havel, 2002) at a local, regional or state level.

The proposal will require clearing of approximately <6.5ha of vegetation for the track construction, with a minimal footprint proposed for the all-weather track meaning significantly less vegetation removal than originally anticipated. Vegetation within wetland areas will not be removed.

The clearing is not likely to be significantly at variance with the Environmental Protection (Clearing of Native Vegetation) Clearing Principles ((a), (b), (c), (e) (f) and (g) and is unlikely to be at variance with the remaining four principles.

## **Declared Rare and Priority Flora**

NAC Flora Specialists (2011) undertook surveys for threatened flora within the road reserve. No declared rare flora (DRF) was recorded in the Subject Site during the flora survey; however 6 priority flora species were recorded *Hemiandra australis*, *Andersonia barbata*, *Astartea* sp. *Scott River*, *Goodenia filiformis*, *Gonocarpus pusilis*, *Styloidium leewinense* were recorded on the site.

NAC noted that *Leucopogon rubricaulis* and *Schoenus submicrostachyus* are both on the western side of their currently known ranges and one species was considered locally endemic, namely *Xyris indivisa*.

There are no threatened or priority ecological communities (TECs or PECs) within or in close proximity to the site.

### **Dieback**

Moore Mapping Dieback specialists (2011) undertook an assessment of the site where *Phytophthora cinammomi* (*P.c.*) was found to span a large portion of the area (3.7km) and was found to be in most of the swampy low lying areas, with the disease expression variable ranging from obvious to subtle which was dependant on the age of infestation (Moore, 2011).

Three sections of track are deemed protectable by Moore Mapping (2011):

- The uninterpretable section at the eastern end of the track, adjacent to Windy Harbour Road;
- The uninfested section which straddles the Gardner River watershed; and
- The uninfested section at the western end of the track, adjoining the private property.

Three short sections of track are deemed unprotectable by Moore Mapping due to their minimal size (2011):

- Two sections between the major creek crossing and the Gardener River watershed; and
- To the west adjacent to sample 3.

### **Fauna**

Fauna Assessment was undertaken by Bio Diverse Solutions in consultation with the DEC where significant fauna such as the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*), Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) and Southern Brown Bandicoot (*Isodon obesulus fusciventer*), are known to use the site, however no species are believed to use the site exclusively.

Disturbance is most likely to occur on a local scale, impacting individual animals, rather than a species or population. It is not considered that the proposal will significantly alter the fauna habitat of the region, or impact on the conservation status of any species.

The wetlands and creek system may form suitable habitat for fish species such as the vulnerable Balston's Pygmy Perch (*Nannatherina balstoni*) (EPBC Act and WCWA) and the Priority 3 species *Galaxiella nigrostriata* (Black-striped Minnow) (WCWA), as water conditions and geology are similar to those in other locations within the broader Gardner Watershed System where there are known populations of the fish.

### **Aboriginal Culture**

Aboriginal Heritage sites exist to the south and east of the Subject Site. A Department of Indigenous Affairs recommended Heritage Consultant (Wayne Webb) undertook a heritage assessment in 2011, finding that there were no probable heritage sites located within the Doggerup Road Reserve Subject Site.

Ongoing consultation is occurring with South West Boodjara Working Party, which speak for the Windy Harbour area, and will continue throughout the project lifespan.

### **Soil and Land Degradation and Acid Sulfate Soils**

The site is located within the Albany-Fraser Orogen, with the main rock types being granite and gneiss intruded by dolerite dykes. The area is located within the Scott Coastal Plain which is based on deposits of sands of marine and alluvial origin and is characterised by extensive swampy plains (Department of Conservation and Land Management (CALM), 2005).

A preliminary Acid Sulfate Soil (ASS) investigation (Kinnear 2011) was undertaken in accordance with the DEC guideline document 'Identification and Treatment Acid Sulfate Soils' (DEC, 2009). Twelve test pits were excavated in and adjacent to the wetland areas within the Doggerup Road Reserve. The subject area sampling /digging test pits, was undertaken in remote wetland regrowth areas along the Doggerup Road reserve adjacent to the D'Entrecasteaux National Park. These areas were targeted from the desktop assessment (70-100% Risk of ASS occurring SLIP dataset 2010) and are inaccessible by vehicle or machine as there is presently no access into the area and being surrounded by National Park.

Of the 20 samples submitted to the Bioscience WA laboratory for analysis, none were found to be Actual ASS, however 6 samples met Potential Acid Sulfate Soil (PASS) criteria, including sulphur levels in the exclusion analysis. As the track construction methodology does not involve disturbing soils in wetland areas, the risk of exposing ASS is considered to be very low.

### **Environmental Management**

An Environmental Management Plan (EMP) has been prepared in consultation with the DEC and the Shire of Manjimup. The EMP documents the Proponent's commitments in regards to pre, post and during construction tasks, including:

- Development of management review and feedback procedures;
- Development of corrective and preventative procedures;
- Development of performance monitoring and measurement procedures on the key features of the proposal which may have an impact on the environment;
- Development of communication procedures to DEC staff, members of the community and government officers, and communicating relevant procedures and requirements to contractors;
- Training, including induction of all contractors, in environmental management procedures;
- Setting of appropriate objectives and targets, including the responsibility for achieving these within the timeframe in which they are to be achieved;
- Specific Action Plans including: weed management, revegetation and rehabilitation, monitoring, pre, post and during construction tasks, long term management and maintenance.
- Dieback management, revegetation and rehabilitation, construction management, drainage management;
- Environmental review of the potential environmental impacts; and
- Review records associated with the EMP.

### **Community and Stakeholder Consultation**

Shellbay Holdings Pty Ltd initiated a stakeholder consultation program for the project to ensure that the needs and concerns of the interested and available members of the community were addressed during the development of the all-weather access track. Information has been disseminated to the Shire of Manjimup, Department of Environment and Conservation (DEC), Wildflower Society, Conservation Council, South West Catchments Council and the South West Boodjara Working Party.

Feedback from the stakeholder and public consultation process will be evaluated and used to inform and guide the refinement of the EMP. Ongoing Consultation will continue throughout the PER process and prior to construction activities.

### **Assessment by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities**

Details of the proposal were submitted to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) for assessment against matters of national environmental significance (MNES) listed under the EPBC Act 1999 (Cwlth), with the outcome that the matter is deemed to be a "Controlled Action" requiring Preliminary Assessment and a decision on approval under the *Environment Protection and Biodiversity Conservation Act (EPBC) 1999* before it can proceed.

## 2. Introduction

### 2.1. Background

Shellbay Holdings Pty Ltd (Proponent) proposes to construct an all-weather access track along a gazetted road reserve “Doggerup Road” (Subject Site) between Windy Harbour Road and Nelson Location 7965 (known as Sandy Peak) on the south coast of Western Australia. Nelson Location 7965 is owned by Shellbay Holdings Pty Ltd who propose to survey and construct the track at their own expense.

The gazetted road reserve, Doggerup Road, is located within the municipality of the Shire of Manjimup, and was gazetted and surveyed approximately 70 years ago when Nelson Location 7965 was freeholded. Nelson Location 7965 is a private property adjoining the south coast with no formal access as it is surrounded by D’Entrecasteaux National Park. The gazetted Doggerup Road reserve extends from Windy Harbour Road to Nelson Location 7965 for approximately 6.5 km, of which 1.5 km was cleared by the Shire of Manjimup approximately 40 years ago.

### 2.2. Approvals Process

Shellbay Holdings Pty Ltd referred the project to the Environmental Protection Authority (EPA) for assessment under the *Environmental Protection Act 1986* (‘EP Act’) in 1988. Subsequent to deferral of the first referral (1988) and an appeal to the then Minister of the Environment, a new Environmental Scoping Document (ESD) was approved by the EPA on the 29/9/2011. The Public Review Environmental Review (PER) Period (as previously established) is for eight weeks.

The PER is a public document subject to an eight week review period. During this time, the public will have the opportunity to prepare submissions to the EPA regarding the proposal. Submissions and specialist advice from agencies will be considered by the EPA in their assessment. In addition to these public and technical submissions, the EPA will also consider their own investigations and associated advice or specifically commissioned research.

The EPA’s advice and recommendations will take the above into consideration during their assessment, and will be presented to the Minister for Environment for a determination of the environmental acceptability of the project along with any environmental conditions that should apply. The public will have the opportunity to appeal the EPA advice when the assessment is published. The Minister for the Environment will make a final decision on this proposal once any appeals have been considered.

### 2.3. Purpose of the Document

This PER has been prepared in accordance with EPA (2009) “*Guidelines for preparing a Public Environmental Review/Environmental Management Programme*”. The intent of this PER document is to:

- Place the proposal in the context of the natural and socio-economic local and regional environments;
- Adequately describe all components of the proposal such that the Minister for the Environment has the required advice to review and consider a well-defined project;
- Communicate in open and accountable forms, the proposal to stakeholders such that the EPA can be advised as to the major issues and concerns held by the community;
- Describe and illustrate the environmental management of the construction of the all-weather access track outlining how each of the identified environmental impacts are minimised and will be managed; and
- Provide the justification and rationale required, demonstrating that this proposal should be judged to be environmentally acceptable by the Minister and the EPA (EPA, 2009).

## 2.4. Structure of the Report

The report is structured in the following format:

**Section 3:** Provides a description of the proposal including details of the proposed location, timing and construction of the all-weather access track

**Section 4:** Provides Shellbay Holdings Pty Ltd justification for undertaking the project and other alternatives considered for the all-weather access track.

**Section 5:** Provides a summary of the environmental legislation and planning framework relevant to the project. A summary of how Shellbay Holdings Pty Ltd has considered the Principles of Environmental Protection is also provided.

**Section 6:** Provides a description of the existing biophysical environment of the site in a local and regional context.

**Section 7:** Provides a description of the existing social environment of the site in a local and regional context.

**Section 8:** Lists the “Key Environmental Factors” identified in the Environmental Scoping Process that occurred in September 2011.

**Section 9:** Provides a summary of the “Potential Environmental impacts, their Significance and Management Responsibilities” identified during the Environmental Scoping process. This section identifies potential environmental impacts with regard to these factors and the proposed project, along with the proposed mitigation and management measures and the predicted outcomes of the proposal being implemented.

**Section 10:** Contains a tabled summary of Section 9.

**Section 11:** Describes the environmental management measures for the proposal.

**Section 12:** Contains a list of abbreviations used in the report.

**Section 13:** Provides a list of references used in the report.

## 2.5. Proponent Details

### **Name of the Proponent**

Shellbay Holdings Pty Ltd

### **Address of the Proponent**

Shellbay Holdings Pty Ltd  
Carol and Barry Owen  
Shellbay Holdings  
36 Eaton Drive  
Eaton WA 6232

### **Key Contact**

Bio Diverse Solutions  
Kathryn Kinnear  
Environmental Consultant  
55 Peppermint Drive  
Albany WA 6330

### **Contact Details**

Kathryn Kinnear

Phone: (08) 9841 3936

E-mail: [kath@biodiversesolutons.com.au](mailto:kath@biodiversesolutons.com.au)



### 3. Description of Proposal

#### 3.1. Project locality

The Subject Site is the Doggerup Road Reserve located adjacent to the D'Entrecasteaux National Park 18km south of Northcliffe and 4 km north of Windy Harbour (Figure 1), within the municipality of the Shire of Manjimup. The Doggerup Road Reserve is positioned east-west in the landscape between Windy Harbour Road and Nelson Location 7965.

**Figure 1 – Project locality**



(Bio Diverse Solutions, 2010)

#### 3.2. Proposal

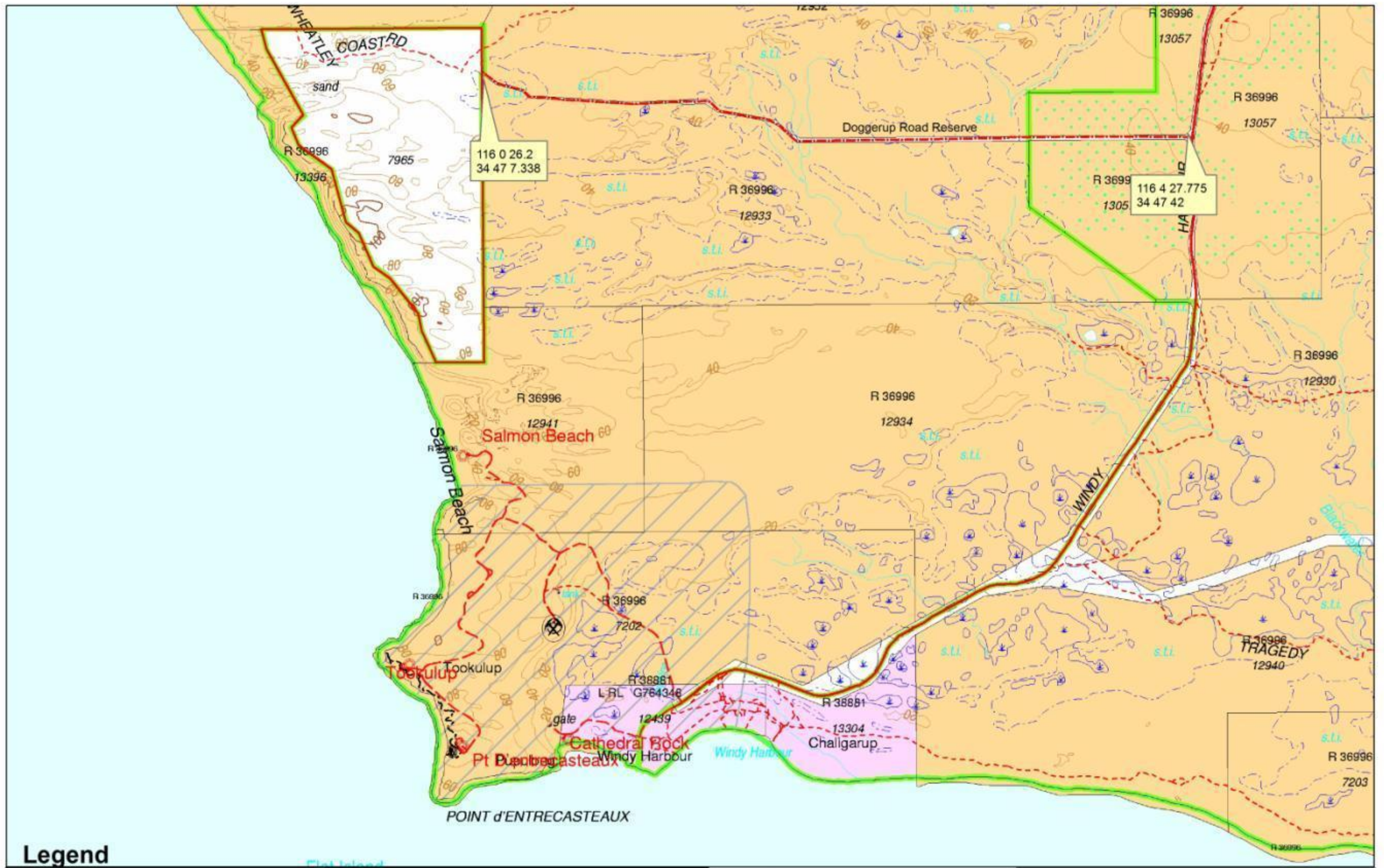
There is no permanent road access to Nelson Location 7965 and currently the property can only be accessed via an existing DEC management track (Wheatley Coast Road) to the north east of Location 7965. This is impassable during winter due to inundation. Permission to use Wheatley Coast Road is currently sought by the Proponent on an annual basis from the Department of Environment and Conservation (DEC). The owners have sought legal access to Nelson Location 7965 via the road reserve since 1995, as did the previous owners.

The road reserve was gazetted in 1924. This PER relates to the 20 metre wide gazetted Doggerup Road Reserve as being the "Subject Site" (Figure 2). The proposed track is described as a 10m wide (6m permanent) clearing within a 20m wide surveyed road reserve surrounded by Class A Reserve, D'Entrecasteaux National Park, which is managed by the Department of Environment and Conservation.



The proposal is for the clearing of native vegetation and the construction of a 6.5 km compacted limestone (3m final trafficable width) all weather access track within the gazetted road reserve from Windy Harbour Road to Nelson Location 7965.



Figure 2 – Doggerup Road Reserve Subject Site



**Legend**

	Nelson Location 7965
	Road centreline

**SCALE**

1:30,000 @ A3

0 0.250.5 1 1.5 2 Kilometers



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CLIENT Shellbay Holdings Pty Ltd Doggerup Road Windy Harbour		
<b>Figure 2 – Doggerup Road Reserve</b>		
STATUS	FILE	DATE
FINAL	LAND001	20/9/2010



### 3.3. Land use and Tenure

The subject site, Doggerup Road, is a road reserve that was gazetted in 1924. The subject site is located within the municipality of the Shire of Manjimup. Care, control and management of public roads are vested in the Local Authority under Section 300 of the *Local Government Act, 1995* (WA).

The road access to Nelson Location 7965 was partially formed and graded from the eastern end by the Shire of Manjimup in the early 1960's. At that time, approximately 1.5km section of road was fully cleared and constructed through Karri type vegetation to a gravel formed standard (including drainage, culverts, pipes, formation) from the Windy Harbour Road.

Doggerup Road is the formal gazetted access to Nelson Location 7965 (also known as Sandy Peak). Sandy Peak (Nelson Location 7965) has been identified through the Augusta-Walpole Coastal Strategy as 'Rural Conservation Zone' (i.e. no subdivision) within the D'Entrecasteaux National Park. It is proposed by the proponent (and in agreement with the Shire of Manjimup) that the newly formed track along Doggerup Road shall become a "Controlled Closed Road" which allows limited access into the location, while providing the proponents with all-weather access to the property.

Surrounding the Doggerup Road Reserve is D'Entrecasteaux National Park. The 116.686ha national park adjacent to the Subject Site (Doggerup Road Reserve) was gazetted in 28 November 1980. The Park comprises two Class A Reserves (no. 36996 and 43961) vested with the Conservation Commission and set aside for the purpose of 'national park and water' (CALM, 2005). The Reserve is managed on their behalf by the Department of Environment and Conservation (DEC) from the regional office at Manjimup and through district work centres at Pemberton and Northcliffe.

### 3.4. Key Characteristics of Project

**Table 1 – Key Characteristics of Project**

Non-spatial elements	Description
Legal Description of site	Doggerup Road Reserve
Zoning	Road Reserve
Municipality	Shire of Manjimup
Vegetation rehabilitation	All disturbed areas.
Spatial elements	Description
Footprint size of current Doggerup Road Reserve	13 ha (6.5km x 20 metre Road Reserve).
Length of road	6.5km (Windy Harbour Road to Nelson Location 7965).
Clearing native vegetation ha (maximum)	Not more than 6.5ha along road within a 10m maximum disturbance boundary/corridor (within 20m Road Reserve). 10 metres width of disturbance corridor within the 20 metre Road Reserve, or 6.5 ha (10m x 6.5km).
Existing cleared area of Road Reserve from previous disturbances	3m width or 1.95 ha (3m x 6.5km).
Total “Actual” amount proposed to be cleared by project (additional to existing).	4.55 ha (6.5ha – 1.95 existing cleared area).

### 3.5. Summary of Key Characteristics of the track construction

A maximum of 6.5 ha will need to be cleared for the project, although less than this figure is anticipated (4.55ha) due to the already cleared nature of the road reserve. It is anticipated that 3.9 ha would be the maximum permanent cleared area (3m running surface, 4m batters). The track is proposed to be constructed using compacted limestone to a minimum thickness of 300mm with batters steepened to limit the extent of clearing necessary.

#### 3.5.1. Site Preparation and Establishment

Vegetation clearing will be undertaken as the road is being built, with any cleared vegetation mulched and placed directly onto rehabilitation areas. Minimal topsoil is proposed to be disturbed, with any topsoil removed and placed directly on revegetation batters and drainage areas. Wetland areas will have a “No Soil Disturbance Policy” to ensure that any Acid Sulfate Soils (ASS) are not disturbed and that hydrological flows are not affected by the construction of the track. Hydrological flows will be maintained by installing a series of pipes along wetland areas.

Earthworks will include:

- Some cut and fill over minor slopes in the western end of the track;
- Re-grading and forming of drainage and track formation (previously undertaken by the Shire of Manjimup) for first 1.6 km;
- Certified dieback free limestone material sourced from local quarry (refer to Appendix 1 for source material);
- Construction and earthworks to occur in dry soil conditions;
- Fill, compaction and pipe/culvert installation over creeks/wetlands and wet areas, and placement of > 250mm pipes to ensure hydrological flows are maintained;

- Stormwater and drainage infrastructure to be located and consistent with surface water monitoring peg locations from past 2 winters monitoring; and
- Briefings from Environmental Officer and Project Officer (Civil Engineer) as per Environmental Management Plan (EMP) on areas of concern, habitat trees to be retained, fauna management, weed management and dieback hygiene management.

Earthworks will **not** include:

- Clearing native vegetation outside of the 20m Road Reserve;
- Clearing native vegetation outside of the 10m disturbance boundary;
- Excavation below water table;
- Disturbance to soils and vegetation in wetland areas;
- Movement of soil or vegetative material across Dieback demarcation areas (Protectable areas); and
- Any track construction in wet soil conditions.

### **3.5.2. General Track Specifications**

MPM Development Consultants undertook a site assessment to investigate the feasibility of constructing the all-weather access track and prepared an Engineering Methodology outlining how it could be achieved with minimal impacts (MPM Development Consultants, 2010). A summary of these findings is provided in the following sections, with the full report provided in Appendix 2.

The purpose of the track is to provide an all-weather, year round access to Nelson Location 7965. The following specifications are proposed to build that track along the gazetted Doggerup Road Reserve:

- 3.0m wide compacted limestone road-base material track;
- Constructed in summer (dry) conditions and designed to create a low speed environment.
- Designated a “Controlled Closed Road”, the track will not be open to the general public and restricting the number of vehicles utilising it;
- The track will consist of limestone road-base material placed on the existing ground surface and compacted to a minimum thickness of 300mm, as per the Engineering Specification (MPM Development Consultants, 2010) and monitoring of late winter water levels at creek and wetland crossings;
- The 3.0m width approximates the existing cleared width of the track along several existing sections;
- The natural ground surface along the length of the existing track and road reserve is gently undulating and the existing crossfall of the land is minimal, the proposal for track construction endeavours to provide the all-weather access while fitting with the existing natural environment; and
- The engineering methodology (MPM Development Consultants, 2010) (Appendix 2) will aim to minimise earthworks and restrict the area of native vegetation and wetland disturbance.

### **3.5.3. Construction methodology**

The track would be constructed on top of the existing surface with minimal clearing vegetation within the road reserve prior to laying and compaction of limestone. It is proposed to construct a limestone roadbase material track 3.0m wide that would be identical to that of existing tracks and roads within the area. The nearby “Summertime Track” has been constructed using a similar methodology by the DEC using quartz/shale material (Photograph 1) and culverts have been constructed to allow for water flow through the landscape. The Summertime Track is subject to seasonal closures, particularly during winter, by the DEC. The construction will be similar, however will allow for all-weather aces by raising the track in wetland or low lying areas.

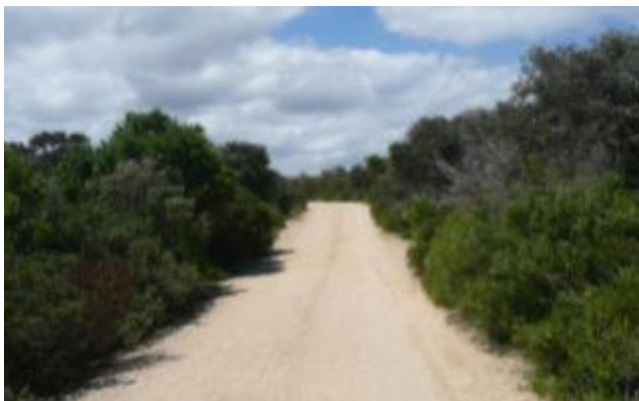
Please refer to Photograph 1 outlining similar constructed tracks within the local vicinity of the project site.



**Photograph 1** - Nearby Summertime Track provides an indication of the type of construction proposed for Doggerup Road.

As shown in Photograph 1, the road-base material is placed on top of the existing ground surface without the formation of defined roadside drains. Wetland/water crossings are formal water crossing (culverts and pipes) and are located beneath the guide posts in the photograph.

Another similar constructed track is the D'Entrecasteaux Road within the Windy Harbour town-site (Photograph 2). This is a 3.0m wide all weather limestone track with the vegetation regrowth occurring right up to and overhanging the track. It should be noted that the track is constructed to take higher traffic volumes than that proposed for Doggerup Road and has minimal track width, no defined drainage and the track is elevated above natural surface level by the actual pavement. Please refer to Photograph 2 showing nearby D'Entrecasteaux Road.



**Photograph 2** - D'Entrecasteaux Road within the Windy Harbour townsite.

The Doggerup Road track is proposed to be constructed in the same manner as the above two local tracks, with the slightly undulating land and minimal cross fall, earthworks being kept to a minimum, and previously disturbed areas utilised for turnaround areas. As previously indicated, the footprint for construction will be within the existing Doggerup Road Reserve with the limestone road base placed directly onto the natural surface. The only area of disturbance will be largely minimised to directly beneath the track, hence less than 6.5ha of vegetation clearing is anticipated.

The marginal cross fall of the existing surface will be accommodated by permitting the limestone road base material to be marginally thicker on one side of the track compared to the other

or having the proposed track finished surface cross fall, match that of the natural surface. The general track design cross section is shown below in Figure 3.

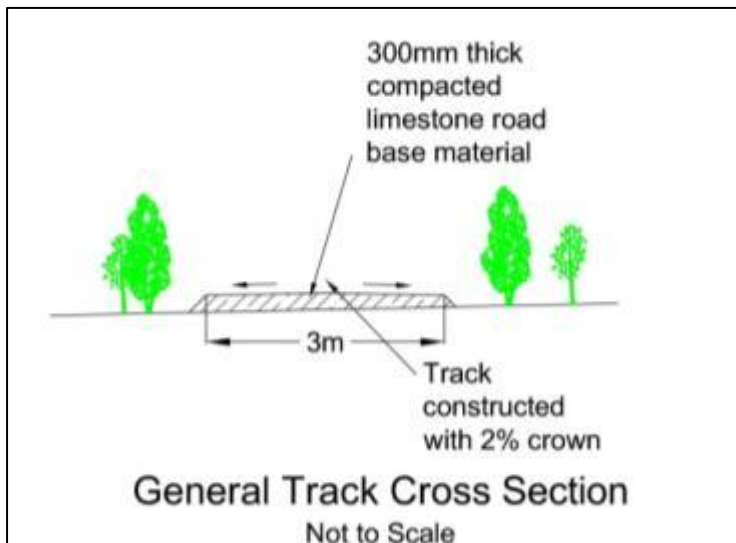


Figure 3: General Track Cross Section (MPM Development Consultants 2010).

### 3.5.4 Wetlands construction, Stormwater management and drainage – No Soil Disturbance

The issue of stormwater drainage has been carefully considered by MPM Development Consultants in the construction methodology of the Doggerup Road track. The purpose of the track's construction is to ensure an all-weather access to Nelson Location 7965 without affecting the existing surface water flows and infiltration. A water crossing location plan is provided (Figure 4) which provides the approximate location of each of the water crossing points, as detailed in a site inspection of the road reserve in October 2010.

As previously outlined and demonstrated in Figure 3, the existing terrain is slightly undulating with minimal cross fall, therefore the need to provide road side drains is not considered necessary. This will also permit water that falls on a particular section of track to be infiltrated as close as possible to the point where it fell rather than directing it to the nearest low point. The drainage associated with the track is assisted by minimising the track footprint, where less water is generated (catchment area) and combined with the absolute minimum vegetation clearing, the water generated is not directed towards bare areas of soil but into the existing vegetation, significantly reducing the potential for erosion issues.

The existing/proposed water crossings are all generally at 90 degrees to the direction of water flow, which will mean the track will not have to divert water out of the road. This will considerably reduce the extent of existing vegetation disturbance and therefore any clearing that may have been required to facilitate a perpendicular and level water crossing. In order to ensure that an all-weather access is provided, it is proposed to increase the thickness of limestone road base to a minimum 500mm at water crossings. Constructing the crossings out of limestone will ensure that any earthworks required are minimised, as the existing material will not be disturbed.

Re-enforced concrete pipes (>250mm) will be used at major water crossings and Main Roads WA Standard guide posts used as vehicle notification of the crossing. Where multiple culverts are used, concrete filled sandbags will be placed for scour protection. Photographs 3 and 4 show examples of culverts constructed in similar terrain.





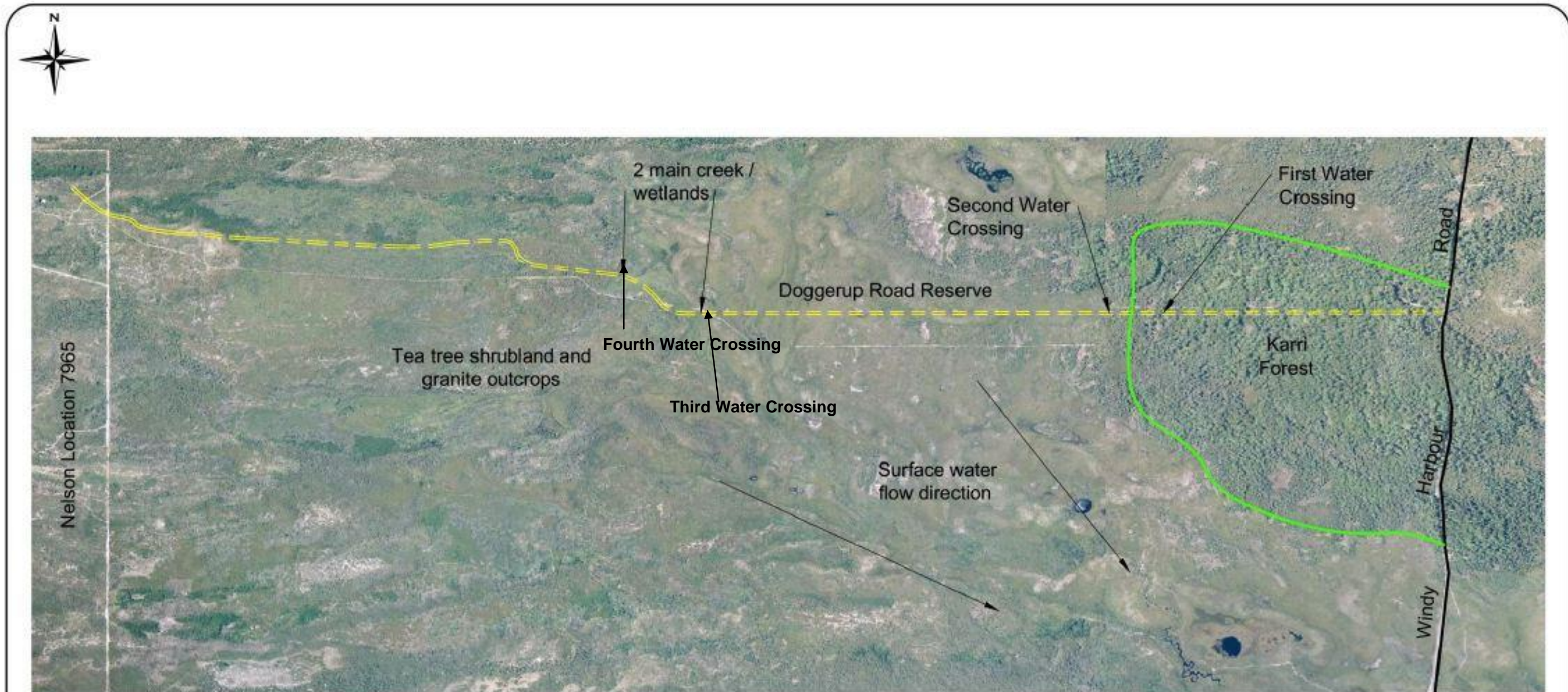
**Photograph 3** - Shows an existing culvert crossing installed by the Shire of Manjimup on Windy Harbour Road. Note is made of the use of reinforced concrete pipework and the Main Roads standard guidepost as a vehicle notification of the crossing.



**Photograph 4** - Shows the existing water crossing on the nearby Summertime Track. The crossing shows multiple culverts with concrete filled sandbags as scour protection.



Figure 4 – Water Crossing Location Plan (MPM 2010)



## Water Crossing Location Plan



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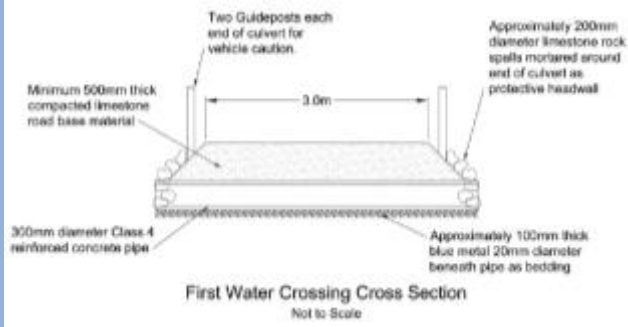
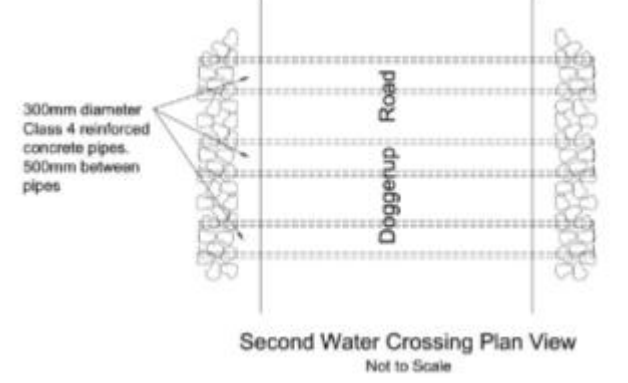
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Do Not Scale



MPM Consultants outlined a methodology for construction over the creek/wetland areas and is summarised in Table 2.

**Table 2 – Summary of proposed drainage and water crossing design as per MPM Consultants (2010) Engineering Report**

Water Crossing	Expected Flow	Methods	Generic Cross Section
<p><b>1<sup>st</sup> Water crossing – edge of Karri Forest (Figure 4).</b></p>	<p>Up to 150mm deep, velocity mainly low due to limited slope</p>	<p>Single 300mm diameter pipe culvert, laid at flat gradient approximately 1 vertical to 350 horizontal.</p>	 <p>Two Guideposts each end of culvert for vehicle caution</p> <p>Minimum 500mm thick compacted limestone road base material</p> <p>3.0m</p> <p>Approximately 200mm diameter limestone rock spalls mortared around end of culvert as protective headwall</p> <p>300mm diameter Class 4 reinforced concrete pipe</p> <p>Approximately 100mm thick blue metal 20mm diameter beneath pipe as bedding</p> <p>First Water Crossing Cross Section Not to Scale</p>
<p><b>2nd Water Crossing, past edge of Karri forest. (Figure 4) Existing culvert constructed by Shire.</b></p>	<p>Up to 150mm deep, velocity mainly low due to limited slope.</p>	<p>Two 300mm diameter pipe culvert, similar to 1<sup>st</sup> crossing. Use of multiple culverts to ensure water flow is not restricted by the track, potential passage for water fauna.</p>	 <p>300mm diameter Class 4 reinforced concrete pipes. 500mm between pipes</p> <p>Diggerup Road</p> <p>Second Water Crossing Plan View Not to Scale</p>
<p><b>3<sup>rd</sup> and 4<sup>th</sup> Water Crossings. (Figure 4). Major crossings, located central of project.</b></p>	<p>Flows in a southerly direction, due to flat terrain, assume to flow in both directions particularly in dry conditions.</p>	<p>Installed as per water crossings 1 and 2, but installed with zero grades to ensure water flow in both directions and no obstruction to water fauna.</p>	<p>Similar construction to diagrams above, proposed to have area surveyed prior to construction to determine low points.</p> <p>The total number of culverts would be determined by detailed design using Australian rainfall and runoff for a large duration rainfall event prior to construction, this would ensure that the smaller yearly rainfall events would be readily conveyed by the culvert network.</p> <p>Construction impacts will be low with “No Soil Disturbance” policy and “laying pipes” on existing wetland/no vegetation clearing methodology.</p>

Areas of ponding along the track have occurred due to the previous works on the track alignment, causing small bunds from the machine work. The depression caused by the machine has since caused ponding of the surface water therefore creating perfect environment for the regrowth of wetland /sedgeland vegetation. The small areas of ponding have no defined link to other water bodies (MPM Consultants 2010). These manmade low points are not considered as areas worthy of retention and highlight the need to construct the track above the existing natural surface to ensure these areas are not created again (MPM Consultants 2010).

### **3.5.5. Maintenance and management**

Preliminary discussion with the Shire of Manjimup (MPM Development Consultants, 2010) indicated that they do not wish to have a rural type road constructed within the existing road reserve, as they do not wish to have another road within the Shire that they will be required to maintain. A typical minimum standard Shire rural road could require a clearing width of approximately 17.0m in order to accommodate a 7.0m sealed road with roadside drains. This level of construction is not proposed in this project, nor is warranted for the situated or wanted by the owners of Nelson Location 7965.

Regular management and maintenance will be carried out via the proponent for a post construction period of 12 months to ensure the road is maintained and not susceptible to erosion or scouring from stormwater. The long term management of the track will become the responsibility of the owners of Nelson Location 7965 (Shellbay Holdings Pty Ltd), a notification on title may be required to ensure the long term maintenance is known to be the responsibility of the property owner. This is important should the land ever be sold by the Proponent (Shellbay Holdings Pty Ltd). The Proponent has given a commitment to maintenance and long term management through the commission and release of these documents (i.e. EMP and the PER document).

During the 12 month post construction period, the proponent gives a commitment to undertake ongoing management of the track that will primarily involve:

- Inspections of the track after large rain events to ensure all culverts and drainage is working correctly;
- Shrinkage of limestone pavement will be addressed by filling with additional limestone road base and compacted with a small machine or large 4-wheel drive;
- Ongoing monitoring for areas of erosion;
- Retrofitting of off-shoot drains if required;
- A series of guidelines could be established between the DEC, the Shire of Manjimup and the owners on the potential issues and potential maintenance solutions, to ensure that all agencies are happy with the ongoing upkeep of the track; and
- Inspections of revegetation and rehabilitation areas for progress and any weed invasions.

An Environmental Management Plan (EMP) has been prepared for the project to direct all environmental management actions and is described in Section 11 and provided in Appendix 3.

#### 4. Alternative Options Considered

Three options were considered when deciding the most appropriate location for access to Nelson Location 7965. These are:

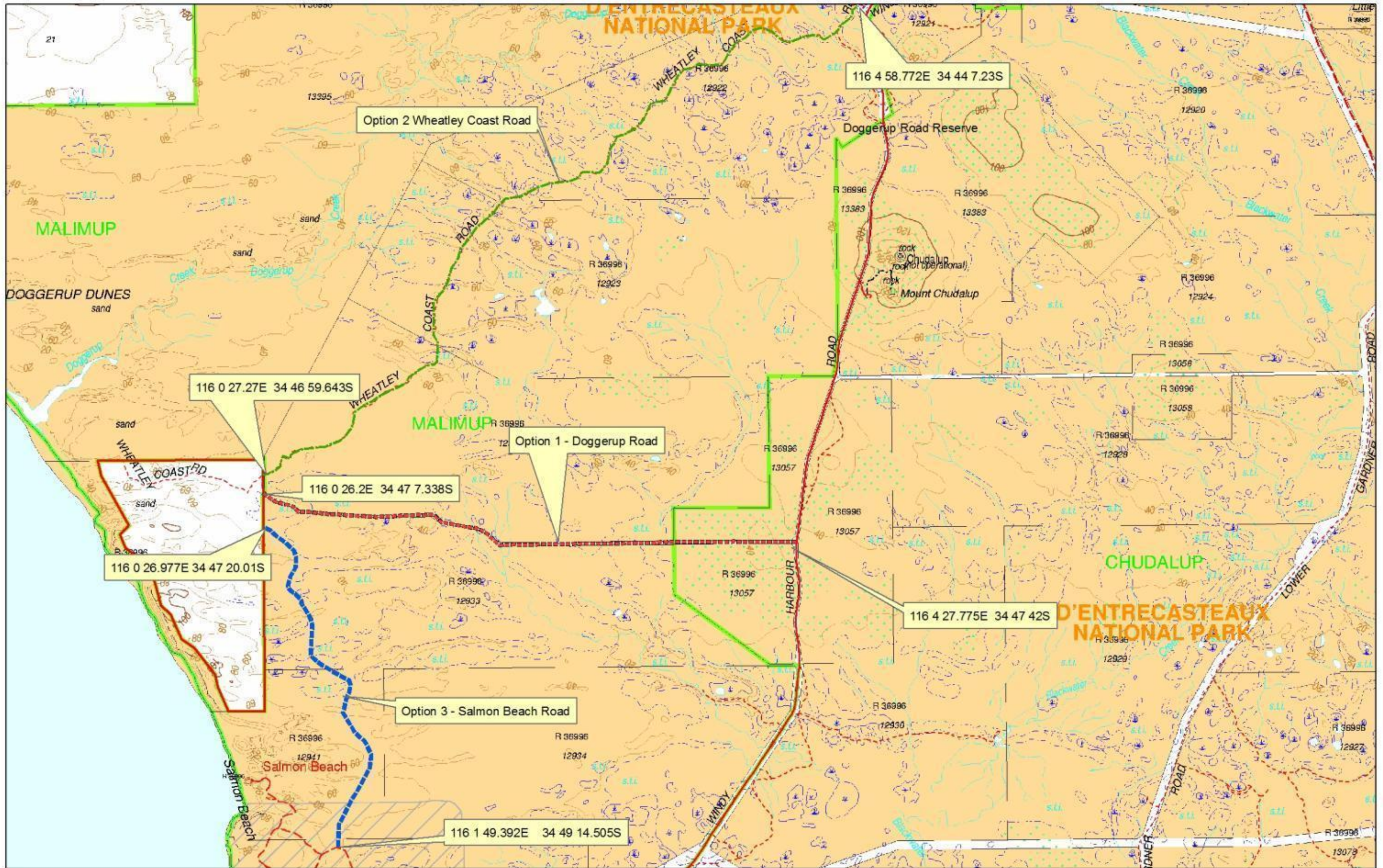
**Option 1** - Doggerup Road Reserve (legally defined access to Location 7965), preferred option;

**Option 2** - Wheatley Coast Road (upgrade of current DEC Management Track); and

**Option 3** - Newly defined access from Salmon Beach Road Access near Windy Harbour.

The locations of the three options are provided in Figure 5, and discussed in this Section. A summary of each of the options is provided in Table 3.





**Legend**

- Option 1 Doggerup Road centreline
- Option 2
- Option 3

**SCALE**  
1:40,000 @ A3

0 0.35 0.7 1.4 2.1 2.8 Kilometers

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**CLIENT** Shellbay Holdings Pty Ltd  
Doggerup Road  
Windy Harbour

**Figure 5 – Alternative Options**

STATUS	FILE	DATE
FINAL	LAND001	20/9/2010



#### **4.1. Option 1 Doggerup Road – Gazetted Road Access to Nelson Location 7965**

Option 1 involves the creation of an all-weather track within the gazetted (and partially cleared) Doggerup Road reserve, this is currently the preferred option and is supported by the Shire of Manjimup as an access route into Nelson Location 7965 (refer Appendix 1). This option is the shortest and most direct route to the property and will result in the least impact to the various environmental values in the area. Refer to Figure 5 – Alternative Options.

It is the Proponents understanding that the Doggerup Road Reserve is a “public road”. A public road is created by either:

- Being set out as a road on an approved original Crown survey creating lots (*Local Government Act 1995* (WA), Section 294A);
- Being set out as a road on an approved original Crown survey creating lots (*Land Act 1933* (WA), Section 126);
- Being declared as a road by notice published in the Government Gazette (*Local Government Act 1960* (WA), Section 288); and
- By being set out as a road through a pastoral lease (*Land Administration Act 1997* (WA), Section 106).

The *Augusta-Walpole Coastal Strategy* (WAPC, 2009) supports the position to facilitate legal access to freehold parcels of land. In preparation of this strategy, the Proponent worked with officers of DEC and provided an assessment of the road access options including keeping the existing road reserve as a private road to limit public access with only the Shire, DEC and the Proponent having access.

MPM Development Consultants (2010) undertook the site assessment and consultation with the Shire of Manjimup in October 2010 and prepared an Engineering Specification report in December 2010, outlining the preferred methodology and management of the track post construction (refer Appendix 2).

##### **4.1.1. Track Designation**

The proposal for the track access on Doggerup Road is to be a “Designated a Controlled Closed Road”, as the aim is to provide all-weather access to Nelson Location 7965, rather than create a road for use by the general public. This designation will assist with controlling unrestricted use.

##### **4.1.2. Limestone source**

The Proponent has sourced limestone material for this project from a local quarry (Walco, Windy Harbour, refer Appendix 1). Testing will be undertaken to certify this source material for dieback (*Phytophthora cinnamomi*) prior to construction commencing. Limestone also acts to restrict the spread of dieback. Limestone shall not be required from any other sources.

##### **4.1.3. Environmental Management**

The proponent has prepared an Environmental Management Plan (EMP) in consultation with the Shire of Manjimup and the DEC. The EMP outlines pre and during construction preparations and gives commitments for post construction environmental management during 6 months, 12 months, 18 months along with annual and long term works. The EMP will be implemented by the appointed (and already contracted) Environmental Officer from Bio Diverse Solutions and the Project Manager/Civil Engineer, as outlined in Section 11 and Appendix 3.

##### **4.1.4. Legal implications**

Option 1 utilises the legally gazetted access to Nelson Location 7965. It is also noted that it is not the policy of the Department of Regional Development to close a gazetted road that provides legal

access to a lot (Nelson Location 7965) without provision of an alternative legal access being created (F.Borello, correspondence dated December 2011, Appendix 1).

#### **4.2. Option 2 – Wheatley Coast Road: DEC Management Track**

The Wheatley Coast Road was closed as public access by the DEC and remains a 4x4 track for DEC personnel access when undertaking on-ground management activities within D'Entrecasteaux National Park (refer Photograph 5). This is presently the only access into Nelson Location 7965 by the Proponent in summer/dry conditions, after being granted an appropriate permit to do so. However, this track is not accessible for 5 months of the year due to inundation and risk of spread of dieback.



**Photograph 5** – View of Wheatley Coast Road entry off Windy Harbour Road. This access is the only option presently available to the proponents under dry weather conditions and with a permit from DEC.

The DEC do not propose to upgrade the Wheatley Coast Road management track to an all-weather standard (Keppel, pers comms 2010).

This track is presently cleared of native vegetation to approximately 4m (width) for the length (12.76km) of the track. If this track were to be upgraded, it would require the additional clearing of some 7.6 ha native vegetation, assuming the width would be increased to 6m along its entire length. Creek and wetland crossings would also be required at a number of locations to make this an all-weather access track.

##### **4.2.1. Legal implications Option 2**

This is not the gazetted access to Nelson Location 7965, and would require a Parliamentary Act to excise the land from D'Entrecasteaux National Park and would require compliance with section 45 of the *Land Administration Act 1997* (refer Correspondence F.Borello, Appendix 1). This option is the least favourable option as agreed by both the DEC and the Proponent.

#### **4.3. Option 3 – Salmon Beach Road through the National Park to the South-East Corner of Nelson Location 7965**

This option is located within a dunal limestone formation which is highly susceptible to coastal erosion forces and slow recovery after disturbance. This option was not supported by the DEC in 1995 (refer Appendix 1) and subsequently dismissed by the client due to the steep terrain and the significant environmental degradation likely from disturbance to fragile unvegetated coastal dune systems and significant creek crossings. Refer to Figure 5 – Access Mapping.

Photographs 6 and 7 shows the terrain in which the road would be constructed if this option were to proceed. The dwellings at Nelson Location 7965 are located in the north east portion of the

property and after traversing coastal dunes and wetlands within the National Park and inside the property (Nelson Location 7965) there is significant exposed terrain which may not recover from disturbance of the vegetation in the longer term.



**Photograph 6** –  
View of vegetated dunes from south end of Nelson Location 7965 Salmon Beach Road.

As shown in Figure 5 – Alternative Options map the selected route for Option 3 attempts to avoid steep and fragile dune systems, but intercepts wetland/dampland areas within the Gardner watershed. The route aims to avoid denuded, steep/mobile sand dunes which are located between Salmon Beach Road and the south end of Nelson Location 7965. This route would present the least environmental degradation over slope which would be required to be overcome in engineering design; however considerable native vegetation would need to be removed to accommodate this option. The proposed track length of the new Option 3 is 4.5km through “pristine” undisturbed vegetation. It is estimated that approximately 9 ha of “pristine” native vegetation would have to be cleared for this option.



**Photograph 7** –  
View to north east from south of Location 7965. Dune swales, pristine vegetation and wetland /damplands areas would need to be traversed.

#### 4.3.1. Engineering Assessment – Option 3

MPM Development Consultants (2010, Appendix 2) undertook a desktop assessment of Option 3 (Figure 5) in regards to access to Nelson Location 7965, with outcomes summarised as follows:

- The additional cross section and longitudinal slope of dune systems will create additional clearing, even if the track is well located around the steeper areas to minimise clearing. Thus the proposed route for this Option is located east of dune systems (Figure 5).



- Cut and fill slopes in loose beach sand should be no steeper than 1 vertical to 4 horizontal, for a 1.0m difference in slope across any particular track section this would require a cleared width of at least 7.0m. Thus the proposed route for this Option is east of dune systems. (Figure 5)
- The cross section and longitudinal slope of the track will be significant over slope and this will necessitate additional earthworks to prepare the track base.
- The scale of machinery required to undertake works in dunes will be larger than that required for Option 1, this equates to additional clearing to manoeuvre the machines.
- The earthworks will require that either the existing material will need to be cut and then utilised as fill, or material will need to be imported to create the base for the track.
- Given the anticipated longitudinal slope of a proposed track if located in dunes, it is likely that roadside drains will be required in several sections in order to convey generated stormwater to low areas, which will necessitate additional clearing width and earthworks.
- This option, if located away from the dunes and to access the north of Nelson Location 7965 is likely to have some major water crossings as per Option 1 and 2.
- Earthworks to create the track base over slope will create bare sand areas at the edge of the track that could be susceptible to erosion during rainfall.
- Bare batters (especially in sand over slope) will need to be protected after earth working with some form of surface protection. The protection could be provided by mulching all of the cleared vegetation (however given the shrubby nature of the vegetation this may not be successful) or through the introduction of rock pitched edges.
- Erosion will occur along the edge of the track or within the roadside drains where the significant slopes will generate stormwater with a significant velocity. Scour protection of the track edges or drains will need to be undertaken, several options exist such as rock pitching the channel base or installing drop structures that allow the channel grade to be reduced between drop points.

Accordingly, this option is considered not favourable for the following reasons:

- Requires a Parliamentary Act to excise land from National Park which is not a practical alternative;
- DEC cannot guarantee that land for the road reserve could be excised from the A Class reserve;
- Aboriginal heritage sites are probable in dune and coastal areas, as indicated by the South West Boodjara Working Party during recent consultation regarding previous road construction activities within the Windy Harbour area ;
- Excision of the road reserve would most probably be opposed by environmental groups as it is within a gazetted National Park;
- The process to excise land from an 'A' reserve could take years and still be unsuccessful in the end; and
- That there are some significant environmental, landscape and construction issues which may not be overcome.

This option has been referred back to the Proponent from the DEC in 2010 after previously being dismissed by the Department in 2005 (Keppel, 2010, pers comms, and correspondence Appendix 1).

A summary of the three options is provided in Table 3

**Table 3 – Summary of Three Options and Key Issues to be Overcome**

Option	Length	Clearing Vegetation (ha) required	Gazetted Road Reserve	Parliamentary Act Required	Present cleared area (ha)	Key issues to be overcome
<b>Option 1 Doggerup Road Reserve</b>	6.5km	6.5ha	Yes Legal access into Nelson Location 7965	No	1.95	<ul style="list-style-type: none"> <li>• Crossing 3 wetland creek areas and “floating road over wetland areas”.</li> <li>• Not supported by DEC</li> <li>• 6 species of Priority flora species</li> </ul>
<b>Option 2 Wheatley Coast Road</b>	12.76km	7.6ha	No	Yes	3.82	<ul style="list-style-type: none"> <li>• Crossing creeks and wetland areas.</li> <li>• Not supported by DEC to upgrade standard of track to all-weather.</li> <li>• Requires Parliamentary Act to excise land from National Park.</li> <li>• Requires more clearing of native vegetation as this is a longer and less direct route to the property.</li> <li>• Watershed flows directly into the Doggerup Creek Wetland System.</li> </ul>
<b>Option 3 Off Salmon Beach Road</b>	4.5km	9 ha	No	Yes	0	<ul style="list-style-type: none"> <li>• Requires avoiding steep coastal dunes which are fragile and susceptible to erosion and prevailing winds.</li> <li>• Requires crossing numerous wetlands, swamps and creeks in the Gardner Watershed.</li> <li>• Likely Aboriginal Heritage issues to be overcome (based on preliminary discussions with Aboriginal Heritage Groups).</li> <li>• The scale of machinery required to undertake these works will be larger than that required for Option 1, this equates to additional clearing to manoeuvre the machines.</li> <li>• DEC previously disapproved of this alternative.</li> <li>• Requires Parliamentary Act to excise land from National Park.</li> <li>• Requires clearing “pristine” native vegetation.</li> <li>• Requires more clearing of native vegetation as there is no existing track definition.</li> </ul>

#### 4.4. Basis for justifying proposal and selecting preferred Option

The preferred Option 1 has the following reasons for being selected as the most favourable:

- It is the legal and formal gazetted road access to Nelson Location 7965;
- The dwellings on Nelson Location 7965 are located in the north east of the property necessitating access to this area, Option 3 requires substantial disturbance to obtain access to the present dwellings;
- Option 1 will have less environmental impact avoiding fragile coastal dune systems as per Option 3;
- Preliminary environmental site assessment has indicated that most environmental concerns by the EPA and DEC can be overcome through an appropriate construction methodology and thorough environmental investigations, with management of these in a documented EMP prepared in consultation with the Shire of Manjimup and the DEC;
- Option 1 does not rely on a Parliamentary Act or excision of land from the D'Entrecasteaux National Park;
- Option 1 will enable all weather access to the private property – Option 2 presently does not provide for this; and
- Option 1 will require less clearing of native vegetation (approximately 6.5ha) than both Option 3 (approximately 9ha) and Option 2 (approximately 7.6ha).

## 5. Legislative Framework

### 5.1. Commonwealth Legislation

An action which will have, or is likely to have, a significant impact on a matter of "national environmental significance" must be referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) under the *EPBC Act*. The proposal was referred to the DSEWPaC in late 2011 for assessment to the *EPBC Act*. The referral is based on potential impacts of the development on listed threatened and migratory species, including the:

- Western Ringtail Possum (*Pseudocheirus occidentalis*),
- Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*),
- Baudin's Black Cockatoo (*Calyptorhynchus baudinii*),
- Quokka (*Setonix brachyurus*);
- Osprey (*Pandion haliaetus*);
- Hooded Plover (*Pluvalis squatarola*);
- Northern Giant Petrel (*Macronectes halli*)
- Balston's Pygmy Perch (*Nannatherina balstoni*)
- Malleefowl (*Leipoa ocellata*)
- Australasian Bittern (*Botaurus poiciloptilus*)
- Gibson's Albatross (*Dioedeia exulans gibsoni*)
- Shy Albatross (*Thalassarche cauta cauta*)
- Chuditch, Western Quoll (*Dasyurus geoffroii*)
- Fork-tailed Swift (*Apus pacificus*)
- White Bellied Sea Eagle (*Haliaeetus leucogaster*)
- Rainbow Bee-eater (*Merops ornatus*)

Details of the proposal were submitted to the DSEWPaC for assessment against matters of national environmental significance (MNES) listed under the *EPBC Act*, with the outcome that the matter is deemed to be a "Controlled Action" requiring Preliminary Assessment and a decision on approval under the *EPBC Act* before it can proceed.

### 5.2. State Legislation, Guidelines and Standards

The *Environmental Protection Act 1986 (WA) (EP Act)* is the primary legislation on environmental impact assessment and protection in Western Australia. The *EP Act* also makes provision for the establishment of the Environmental Protection Authority (EPA) for the conservation, preservation, protection, enhancement and management of the environment and prevention, control and abatement of pollution.

The proposal was initially referred to the EPA in January 1998, with the PER made available for public review for eight weeks from 21 September 1998 to 13 November 1998. Thirteen submissions were received from government agencies, environmental groups and the public.

The Proponent is providing updated information in this (second) PER to be assessed by the EPA and they will provide advice to the WA Minister for Environment so that a determination can be set as to the environmental acceptability of the project as well as the environmental conditions that will apply.

Further information on the *EP Act* approvals process is provided in Section 2.2 of this report. In addition to gaining the approval of the Minister for Environment, the Proponent must comply with other legislations and regulations through the approvals, design, construction and operational phases of the project. A summary of the most relevant Acts and regulations that apply to the project is provided in Table 4, along with a brief explanation of their relevance. The Proponent will adhere to the requirements of all applicable legislation during the design and implementation of the project.

**Table 4 – State Government Legislation Application to the Doggerup Road Reserve Proposal**

<b>Legislation</b>	<b>Responsible Government Agency</b>	<b>Aspect</b>
<i>Aboriginal Heritage Act 1972</i>	Department of Indigenous Affairs	Archaeological and ethnographic heritage
<i>Agricultural and Related Resources Protection Act 1976</i>	Department of Agriculture and Food, Western Australia	Weeds and feral and/or pest animals
<i>Bush Fires Act 1954</i>	Fire and Emergency Services, Department of Environment and Conservation	Wild fire control
<i>Conservation and Land Management Act 1984</i>	Department of Environment and Conservation	Wetlands/flora and fauna / habitat /weeds / pests / diseases
<i>Contaminated Sites Act 2003</i>	Department of Environment and Conservation Management	Control of pollution, acid sulfate soils
<i>Country Areas Water Supply Act 1947.</i>	Department of Water	Water resources supply
<i>Environmental Protection Act 1986 (Part IV)</i>	Office of the Environmental Protection Authority	Assessment and management of environmental impacts
<b>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</b>	Department of Environment and Conservation	Clearing of native vegetation
<b><i>Fire and Emergency Services Authority of Western Australia Act 1998</i></b>	Fire and Emergency Services	Emergency services for bushfire
<b><i>Heritage of Western Australia Act 1990</i></b>	Heritage Council of Western Australia	European heritage management
<b><i>Land Drainage Act 1925</i></b>	Department of Water	The use of drains and drainage water
<b><i>Land Administration Act 1997</i></b>	Landgate	Creation of roads within a national park
<b><i>Local Government Act 1995</i></b>	Shire of Manjimup	Development approvals, management of Road Reserve
<b><i>Soil and Land Conservation Act 1945</i></b>	Department of Agriculture and Food	Protection of soil resources
<i>Wildlife Conservation Act 1950</i>	Department of Environment and Conservation	Protection of indigenous wildlife

### **5.3. Applicable Guidelines and Standards**

In addition to the above mentioned legislative requirements, the EPA provides direction for environmental protection and impact assessment through published guidelines and position statements. The key position statements and guidelines likely to be of relevance to the Doggerup Road proposal and that have been taken into consideration during the assessment process are listed in Table 5.

**Table 5 - EPA Guidance and Position Statements relevant to the Project**

Guidance Statement No.	Title	Application
6	Rehabilitation of Terrestrial Ecosystems	Outlines the principles to be applied during clearing in the areas that will be rehabilitated after construction. These areas may include batters, service infrastructure corridors and road verges
18	Prevention of air quality impacts from land development sites	Provides guidance on the control of dust during clearing and earthworks associated with land development projects
33	Environmental Guidance for Planning and Development	Provides an overview of environmental protection processes and information, to assist land use planning and development in Western Australia. Describe referral and environmental impact assessment processes under Part IV of the Environmental Protection Act 1986 and, in particular, the procedures applied to schemes. Provides the EPA's advice on a range of environmental factors in order to assist participants in land use planning and development to protect, conserve and enhance the environment.
51	Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia	Outlines the standards and protocols that the flora surveys need to meet.
55	Implementing Best Practice in Proposals Submitted to the Environmental Impact Assessment Process	Provides guidance on the use of best practice options in design and implementation of the project.
56	Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia	Outlines the standards and protocols that the fauna surveys undertaken for the project need to meet.
2	Environmental Protection of Native Vegetation in Western Australia	Provides guidance on the principles of native vegetation protection that will be used in identifying the areas of highest conservation value within the project area and assessing the significance of proposed vegetation clearing.
3	Terrestrial Biological Surveys as an Element of Biodiversity Protection	Provides guidance on the assessment on the biodiversity implications of vegetation clearing.
6	Towards Sustainability	Outlines broad sustainability principles and guidance on the relevant issues of sustainable communities, transport and energy efficiency.
7	Principles of Environmental Protection	The principles will be used in the assessment of the significance of potential impacts and developing overarching project objectives.
8	Environmental Protection in Natural Resource Management	Provides guidance on the environmental impact assessment and management of natural resources.

#### 5.4. EP Act Principles of Environmental Protection

Section 4A of the *EP Act* establishes five principles of environmental protection, which have been expanded upon in EPA Position Statement No. 7 (EPA, 2004). These principles of environmental protection have been taken into consideration during the planning phases of the Doggerup Road project. A summary of how each of the five principles has been applied to the project is provided in Table 6.



**Table 6– Principles of Environmental Protection**

<b>Principle of Environmental Protection</b>	<b>Relevant</b>	<b>Consideration</b>
<b>Precautionary Principle</b>	Yes	Shellbay Holdings Pty Ltd have completed a range of scientific investigations and technical assessments to determine the baseline environmental conditions at the site and to identify potential impacts of the proposed track development on the surrounding environment. The proposal has been designed to minimise, and where possible avoid, any serious or irreversible damage to the environment.
<b>Principle of Intergenerational Equity</b>	Yes	<p>Shellbay Holdings Pty Ltd is committed to the principles of sustainable development, and considers that the proposed track construction will not adversely impact on the environment for future generations.</p> <p>The all-weather track construction design is guided by a project specific sustainability framework, with the engineering and design having been informed by:</p> <ul style="list-style-type: none"> <li>• A stakeholder and community consultation program;</li> <li>• Aboriginal heritage investigations and consultation; and</li> <li>• A range of technical investigations into the characteristics of the road reserve environment.</li> </ul> <p>Specific features that uphold the Principle Intergenerational Equity include (but are not limited to):</p> <ul style="list-style-type: none"> <li>• the retention of most trees &gt;250mm diameter (&gt;500 in Karri trees) on site, to avoid impacts on future habitat trees and wildlife;</li> <li>• Avoiding threatened flora where possible;</li> <li>• Respect for the site’s topography, hydrology and groundwater quality;</li> <li>• Development and implementation of an Environmental Management Plan (EMP) in consultation with the DEC and Shire of Manjimup ;and</li> <li>• Development of a number environmental management measures to minimise or avoid negative impacts to the environment.</li> </ul>
<b>Principle of Conservation of Biological Diversity and Ecological Integrity</b>	Yes	<p>Terrestrial fauna and flora assessments, Wetland Assessment, Dieback Assessment, and Acid Sulfate Soils Assessment have been completed to determine the baseline floristic and faunal values of the site and potential impacts on biological diversity and ecological integrity.</p> <p>Most vegetation adjacent to existing track is in excellent condition and Shellbay Holdings Pty Ltd commits to rehabilitating areas alongside the track and where previous disturbance (i.e. old borrow pits) have occurred. Measures to manage Dieback and weeds on the site will be implemented in the EMP.</p>
<b>Principles relating to improved Valuation, Pricing and incentive Mechanism</b>	Yes	<p>The cost of Environmental Management has been considered in this project. Bio Diverse Solutions (Environmental Consultants) have been appointed to implement the EMP and oversee all pre, during and post construction activities. The Engineering Specification (MPM Development Consultants) is reliant on a minimal footprint for the track, utilising existing cleared areas for passing /turn around areas, floating road over wetlands, ensuring hydrological flows are not altered. MPM Development Consultants have been engaged to (Civil Engineer) to oversee the Project Management and implementation Engineering specification.</p>
<b>Principles of Waste Minimisation</b>	Yes	<p>All vegetation removed shall be utilised in rehabilitation areas. Any weed material shall be sprayed prior to commencement of site works or removed to approved green waste disposal areas. Limestone shall be imported to the site from local quarries, reducing the need for further clearing of native vegetation from other locations.</p>



## 6. Existing Biophysical Environment

### 6.1. Climatic Conditions

Windy Harbour (4km to the south of the subject area) experiences a mild Mediterranean climate characterised by wet winters, and warm dry summers. Rainfall is seasonal, usually through the winter months of July to September which are characterised by rain bearing weather systems. The Subject Site is situated between Windy Harbour and Pemberton Bureau of Meteorology Weather Stations, with some variation recorded between the 2 sites.

The Bureau of Meteorology (BoM) average rainfall for Pemberton (approximately 30km to the north), Windy Harbour (approximately 4km to the south) and Northcliffe (18km north) has been provided in Table 7.

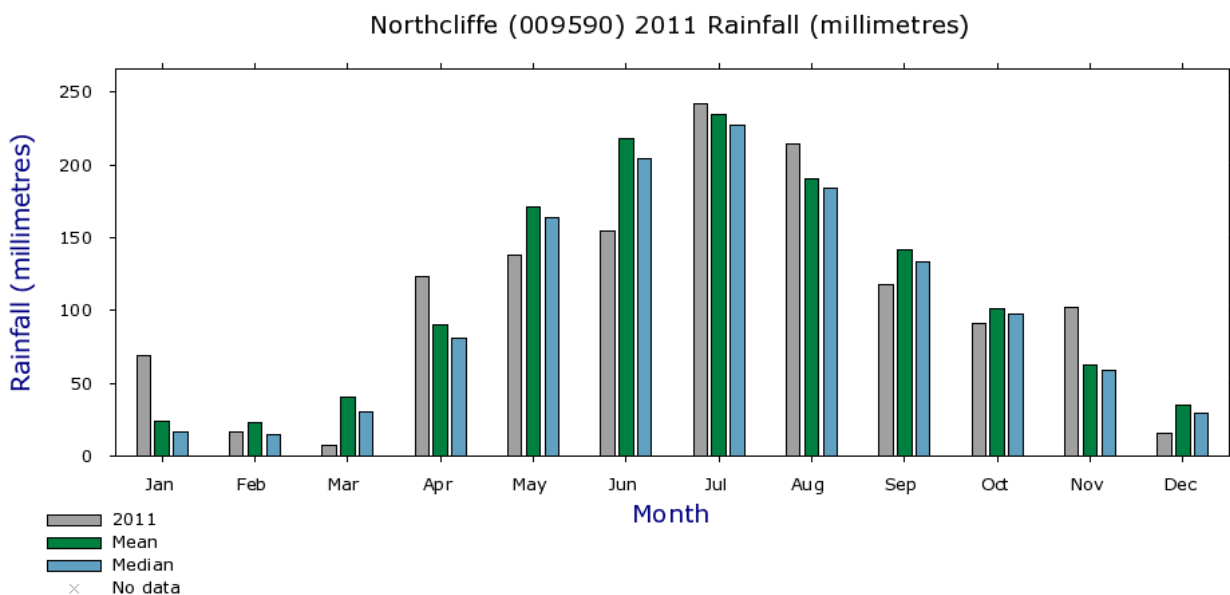
**Table 7 – Bureau of Meteorology (BoM) Rainfall Statistics as at 30 December 2011**

BoM Weather Station	Data collection period	2009 Annual Rainfall (mm)	2010 Annual Rainfall (mm)	2011 Annual Rainfall (mm)	Average Annual Rainfall (mm)
Pemberton	1941-2011	1269.4	669.1	928.2 *	1191.4
Windy Harbour	1984-2011	1019.5	809.8	1222.8	1044.9
Northcliffe	1925-2011	1373.8**	796.3	1293.1	1132.1

\* Incomplete data (July 2011 missing) \*\* Incomplete data (Dec 2011 missing (source BoM 2011))

The data sourced from the BoM Climate Database indicates that 2010 underwent a drying trend, when compared to previous year's, with 2011 indicating a return to "average" rainfall. The Northcliffe station has the most extensive data and most complete rainfall information of the three stations (1925-2011). The mean average rainfall data for Northcliffe area varies between less than 25mm (in January) and in excess of 235mm (in July), (Figure 6).

**Figure 6 – 2011 Rainfall Northcliffe Station**



Note: Data may not have completed quality control

Climate Data Online, Bureau of Meteorology  
 Copyright Commonwealth of Australia, 2012

(Source Bureau of Meteorology, 2012)

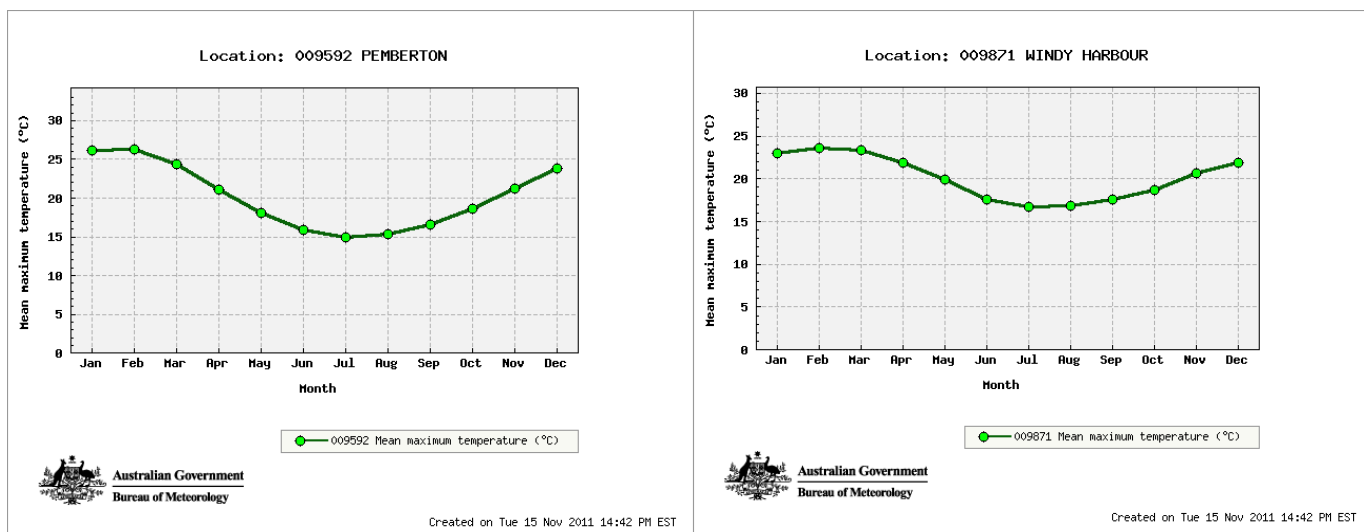
Summer months are characterised by easterly to south easterly winds prevailing over the area due to the frequent high-pressure systems. Differential heating of the land and sea produces on-shore

sea breezes to the area. In the winter months the dominant winds are westerly to north westerly due to northern high pressure belts, and low rain-bearing depressions from the south west.

Long-term average temperatures are available from BoM Pemberton Station and Windy Harbour Station. Pemberton's highest temperatures experienced in January (up to 43.2°C) and the lowest minimum in August (7.3°C), whereas at Windy Harbour, the highest temperatures are experienced in March (40.3°C) and the lowest minimum in June (11.4°C). Mean maximum temperatures vary by a few degrees from each station for Pemberton and Windy Harbour due to coastal influences, as shown below in Figures 7 and 8.

Figure 7 Mean Temperatures (Max) Pemberton

Figure 8 Mean Temperature (Max) Windy Harbour



(Source: Bureau of Meteorology, 2011)

Climate change is expected to impact on the future rainfall pattern of the area. It is recognised that the average rainfall has already declined by 20%-30% over the past few decades and that the long term impact of climate change may lead to a shift in rainfall, as well as dryer climatic conditions for the region. The long term changes are predicted to impact on the flora, fauna and water availability for the region. (Climate Commission, 2010)

The Climate Commission (2010) estimates that:

*“...Rainfall patterns in Western Australia have changed over the last 40 years. There is significant evidence that climate change has contributed to the marked drying trend in the southwest of the state.”*

The all-weather track construction of Doggerup Road is not predicted to be affected by sea-level rise, however it could be affected from increased intensity rainfall events or extended drying periods. The engineering specification (Appendix 2) as outlined by MPM Development Consultants has been designed to ensure that hydrological function is maintained while structural integrity is achieved for the access track, (MPM Development Consultants, 2010). The use of crushed limestone will assist with ensuring the track can withstand increased rainfall and storm events such as those that may be associated with climate change impacts.

## 6.2. Geology, Soils and Landforms

The site is located within the Albany-Fraser Orogen, with the main rock types being granite and gneiss intruded by dolerite dykes. The area is located within the Scott Coastal Plain which is based on deposits of sands of marine and alluvial origin and is characterised by extensive swampy plains (CALM, 2005).

The Subject Site traverses five (5) geological, soil and landscape map units. Table 8 outlines the broad scale regional mapping of the subject area in regards to landform, geology and soils, with the location of the different map units shown in Figure 9.

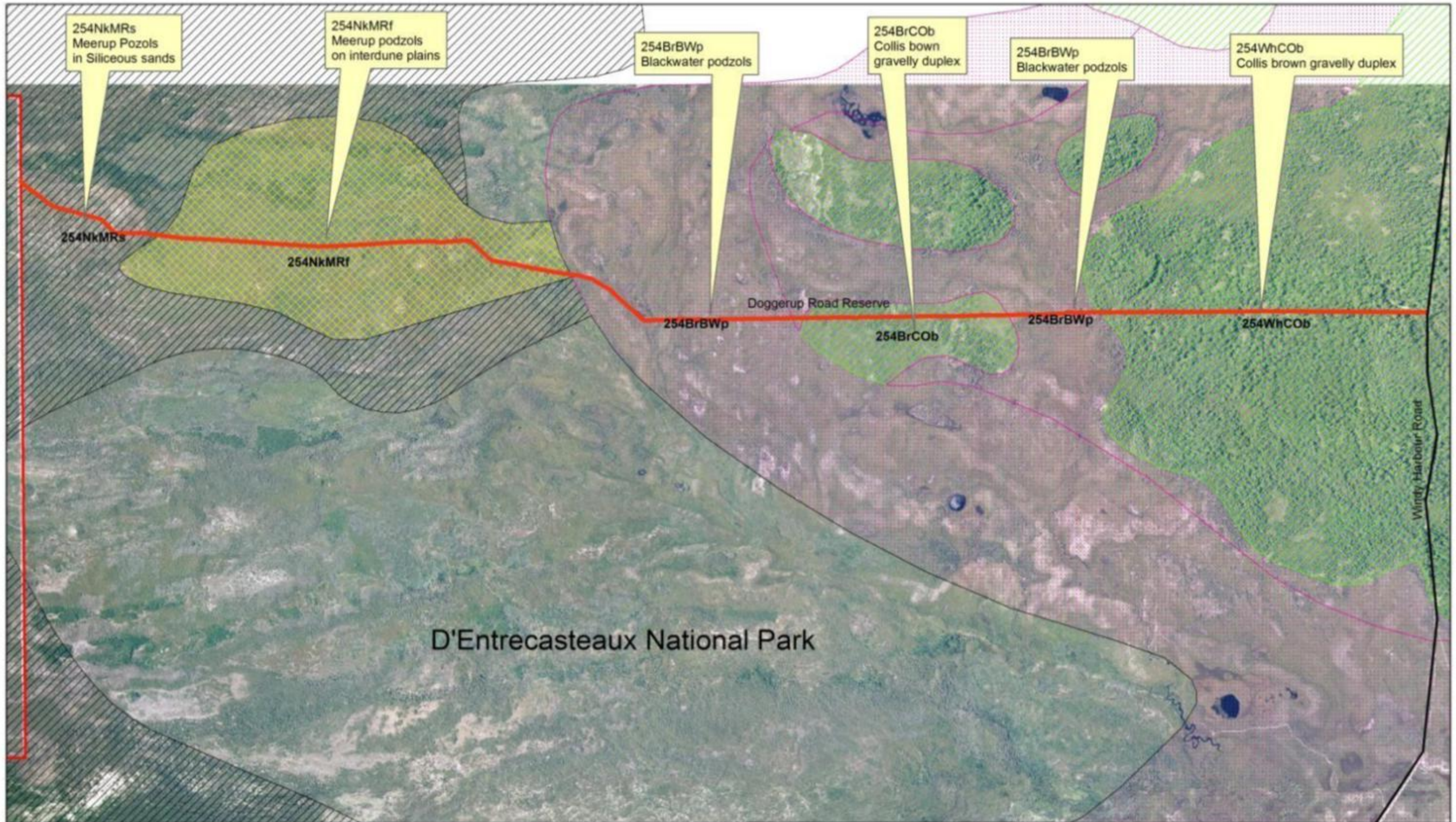
**Table 8 – Landform, Geology and Soils**

Map Unit Code (SLIP)	Map Unit Name (SLIP)	250K Hydrogeology Mapping (DoW) Aquifer	Geology (DoW)
254BrCOb	Collis brown limestone duplex	Fractured and weathered rocks – local aquifer very minor or no ground water resources	P_n – Granitoid Gniess – migmatite, quatrzo-feldspathic gneiss; subsurface weathered to clay
254BrBWp	Blackwater podzols	Sedimentary aquitards and local aquifer – minor to no groundwater resources	Tpe – Estuarine – lagoonal and lacustrine deposits
254WhCOb	Collis Brown limestone duplex	Fractured and weathered rocks – local aquifer very minor or no ground water resources	P_no - Granitoid Gniess – migmatite, quartzo-feldspathic gneiss subsurface weathered to clay
254NkMRf	Meerup podzols on interdune plains	Sedimentary aquitards and local aquifer – minor to no groundwater resources	Tgc – Alluvial lacustrine and shallow marine deposits – clay and sand
254NkMRs	Meerup podzols in siliceous sands	Surficial deposits – local aquifers, minor to major groundwater resources.	Qpl – Dunes limestone – eolian calcarenite

(Source: Department of Water, 2001; SLIPs NRM Portal, 2010)



Figure 9 – Hydrogeology, Geology, Landform and Soils



D'Entrecasteaux National Park

**Legend**

- Windy Harbour Road
- Road centreline
- Nelson Location 7965
- ▨ Collis brown gravelly duplex
- ▨ Meerup podzols siliceous sands
- ▨ Blackwater podzols
- ▨ Meerup podzols interdune plains

**SCALE**  
1:16,000 @ A3

0 0.10.2 0.4 0.6 0.8  
Kilometers



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<b>CLIENT</b> Shellbay Holdings Pty Ltd Doggerup Road Windy Harbour		
<b>Figure 9 – Hydrogeology, Geology, Landform and Soils</b>		
STATUS FINAL	FILE LAND001	DATE 20/9/2010



### 6.3. Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally occurring soils containing iron sulphides. These soils are typically benign within an anaerobic environment. However, when they become oxidised through disturbance, acidification of soil and groundwater can occur. The resulting sulphuric acid can also break heavy metal bonds, releasing metals such as aluminium, iron and arsenic into the groundwater and environment.

A desktop assessment aimed at determining the potential for ASS within the project site indicated that there is a high (70-100%) risk in the 254BrBWp Map unit being soils from estuarine/lagoonal origin. Site investigations indicated the site is loams over clay in the east (Karri Forest areas) grading to sands over granite (depressional areas with silts) through the central area and deep sands in the west (grading to dune systems) (refer to Photographs 8 to 11).



**Photograph 8** – View of termite mound showing grey sands adjacent to granite outcrop.



**Photograph 9** – View of loamy soil from scratching, most probably from echidna, in Karri forest area.



**Photograph 10** - Peats/sands over granite in low lying areas. These areas have surface water movement (winter watershed) during peak rainfall periods, drying in summer conditions to isolated pools. Depressional areas exhibit silts accumulating on surface from horizontal water movement. Photograph central wetland area along road reserve.



**Photograph 11** – Deep Grey sands exist in the eastern portion of the subject area. Vegetation consistent with occasional groundwater sources adjacent to road reserve (*Taxandria juniperina*). No peats encountered along road reserve in this soil type.

The Preliminary ASS Investigation (Kinneer 2011) was undertaken in accordance with DEC Identification and Treatment Acid Sulfate Soils (DEC 2009). Twelve test pits were excavated in and adjacent to the wetland areas within the Doggerup Road Reserve. The subject area sampling /digging test pits, was undertaken in remote wetland regrowth areas along the Doggerup Road Reserve adjacent to the D'Entrecasteaux National Park. These areas were targeted from the desktop assessment (70-100% Risk of ASS occurring, SLIPs NRM Portal, 2010) and are inaccessible by vehicle or machine as there is presently no access into the area as it is surrounded by National Park.

None of the 20 samples submitted to Bioscience WA for Laboratory testing were found to be Actual ASS, however; six (6) samples met potential ASS (PASS) criteria, including sulphur levels in the exclusion analysis (Appendix 4). As the engineering proposal to build the track involves no soil disturbance in wetland areas, the subsequent risk assessment of the possibility of disturbing Acid Sulfate Soils is deemed to be low. Assessment by the DEC Contaminated Sites Branch approved the ASS Investigation findings, (refer to correspondence provided in Appendix 1).

#### 6.4. Hydrogeology and Groundwater

A review of the Department of Water 250K Hydrogeology Mapping information indicates that there are minor or no groundwater resources in close proximity to the site (refer Table 9, and Figure 9). Accordingly, groundwater is not likely to be intercepted and will not be impacted as a result of this project proceeding.

**Table 9 – Hydrogeology**

Map Code (SLIP)	Unit Name (SLIP)	250K Hydrogeology Mapping Aquifer (DoW)	Geology (DoW)
254BrCOB	Collis brown limestone duplex	Fractured and weathered rocks – local aquifer very minor or no ground water resources	P_n – Granitoid Gniess – migmatite, quartzo-feldspathic gneiss; subsurface weathered to clay
254BrBWp	Blackwater podzols	Sedimentary aquitards and local aquifer – minor to no groundwater resources	Tpe – Estuarine – lagoonal and lacustrine deposits
254WhCOB	Collis Brown limestone duplex	Fractured and weathered rocks – local aquifer very minor or no ground water resources	P_no - Granitoid Gniess – migmatite, quartzo-feldspathic gneiss subsurface weathered to clay
254NkMRf	Meerup podzols on interdune plains	Sedimentary aquitards and local aquifer – minor to no groundwater resources	Tgc – Alluvial lacustrine and shallow marine deposits – clay and sand
254NkMRs	Meerup podzols in siliceous sands	Surficial deposits – local aquifers, minor to major groundwater resources.	Qpl – Dunes limestone – eolian calcarenite

#### 6.5. Topography and Surface hydrology

The Doggerup Road Reserve traverses undulating plains within the 25m and 50m contours. The lowest contours are at 25m in surface watershed areas, grading up to 40m in the limestone duplex soils (east) and 50m in the coastal dune landforms (west).

The Subject site is located within the Shannon River Hydrographic Catchment Basin and the Gardner River local catchment (SLIP 2010). The subject site is the upper watershed of the Blackwater Creek which flows to the Gardner River in south east of the subject area (NAC 2011). Further to the north of the subject area, the surface watershed drains towards the Doggerup Creek System. Contour mapping shows that the subject site does not drain to the Doggerup Creek, but to the Gardner River watershed (refer to Figure 10, and Wetland Assessment Report (NAC, 2011b), in Appendix 5).

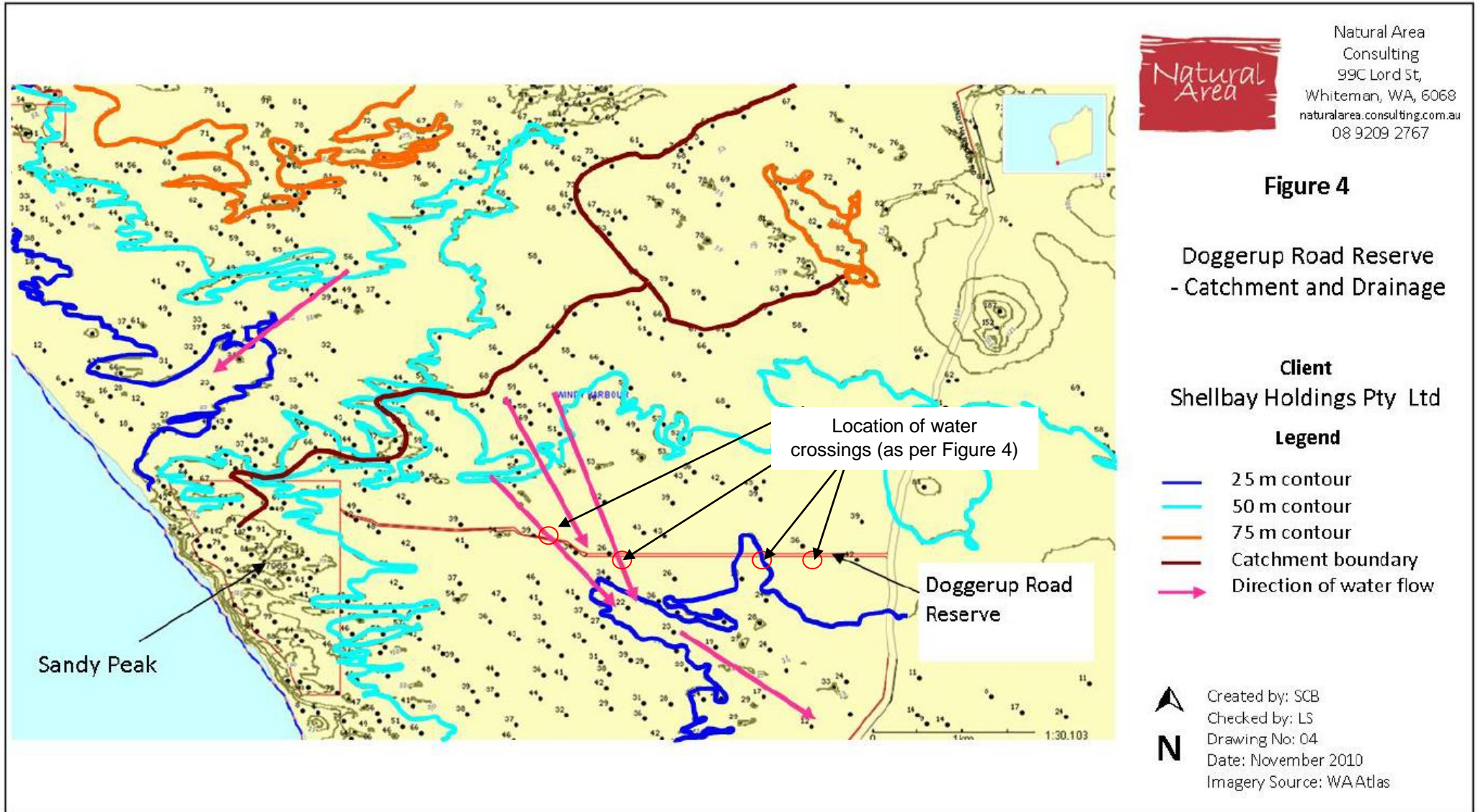
The topography of the site precludes water draining to the Doggerup Creek to the north west, this was confirmed by mapping undertaken by the DEC in 2007 for Western Shield Operations (NAC, 2011b) and shown in Figure 10, and via DEC Mapping Geomorphic Wetlands, Augusta to Walpole (2003) shown in Figure 11. Ephemeral wetland areas within or immediately adjacent to the road reserve appear to be winter wet depressions that fill after significant rainfall events and then dry out during warmer periods (NAC, 2011b).

V & C Semeniuk Research Group (1997) mapped the wetlands between Augusta to Walpole and referred to the subject area as the Sandy Peak Suite (MW19):

*“This is a suite which incorporates a drainage system of paluslopes (on the coastal dunes), adjacent palusplain, floodplain, creeks and drainage lines of surface water and groundwater flow. This is overprinted by linear dune ridges and outlying arms of the coastal and parabolic dunes. The arms of the dunes segment areas of paluslope into separate entities, but the system is integrated through the dominant drainage flow pattern which is to the south east towards the Gardner River. The area seems to be a discharge area for fresh groundwater and surface water flow from the western coastal dunes. Although sedgelands and shrublands line the channels, the dominant vegetation is latiform heath comprising species of Agonis, Homalospermum and Astartea. The substrate is peaty or humic sand overlying fine quartz sand.*

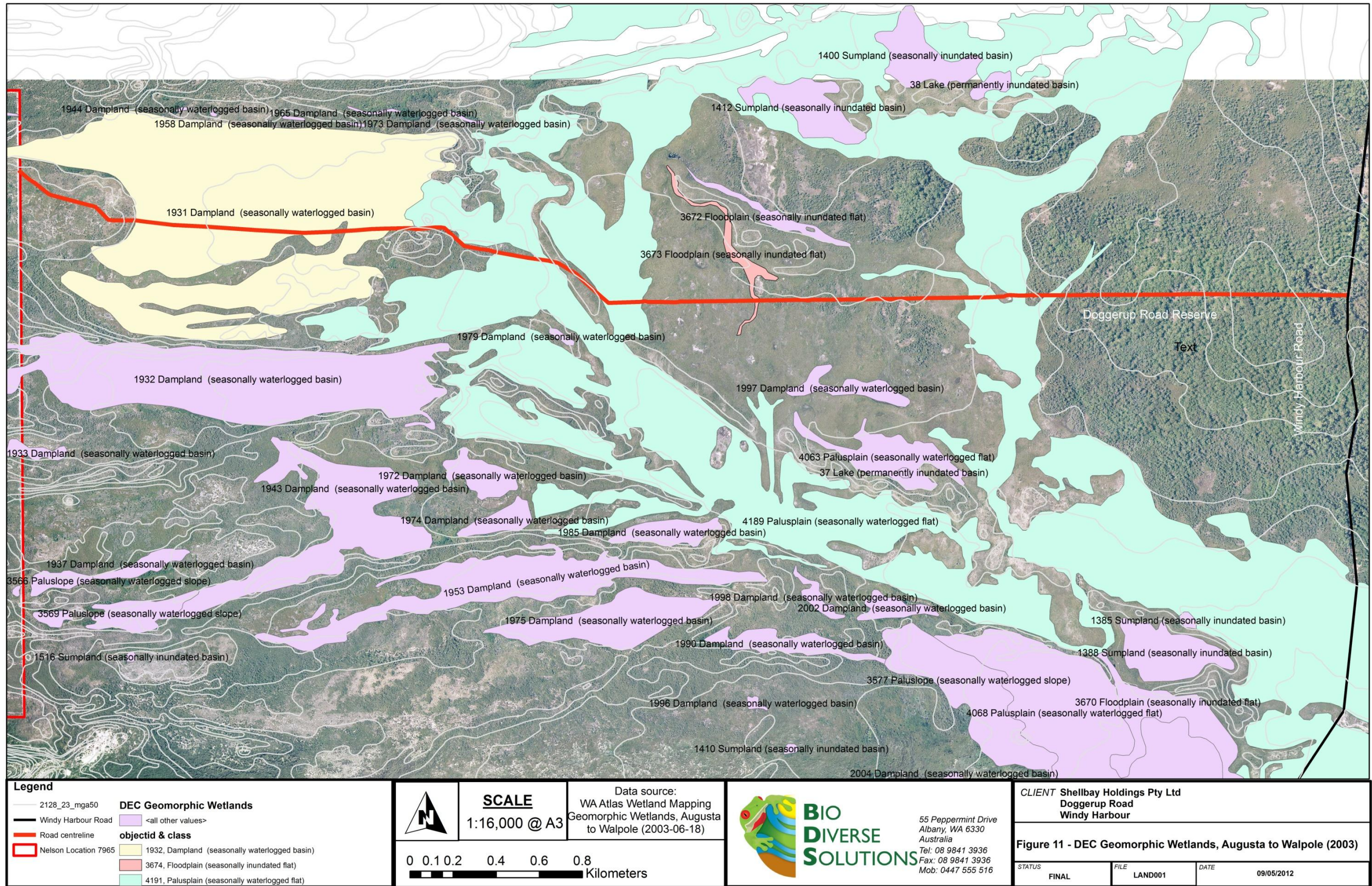


**Figure 10 – Wetlands Catchment and Drainage**





**Figure 11 – DEC Geomorphic Wetlands August to Walpole (2003)**





Surface water (coverage/extent) monitoring commenced in winter of 2010 with pegs marking the extent of all surface water across the existing track in Doggerup Road Reserve. All sites were re-inspected in late winter 2011 by Kathryn Kinnear, Bio Diverse Solutions. Surface water assessment over spring (2010) and late winter (2011) indicates that the creeks and swamps intersecting the Subject Site are dependent on the surface catchment and not groundwater, with water draining rapidly after rain events. Groundwater may be evident in the area, however does not exhibit surface expression.

Surface water area monitoring commenced in August 2010 marking extent of water cover over the road reserve and project footprint, refer to Photographs 12 and 13 below. Pooling of surface water has occurred from previous track disturbances, these areas are winter wet and summer dry and confined to sand over granite areas.



**Photograph 12** – View of wet area in spring 2010. Winter water cover was to the extent of the pegs.



**Photograph 13** – Pooling occurs temporarily after rain in depressions associated with previous disturbance.

All seasonal creek areas were dry to damp with no surface waters during the inspection carried out in late summer conditions (March 2011). Inspection during the winter of 2011 revealed that surface water extent had not breached higher than the surface water extent that occurred during 2010, as shown in Photographs 14 and 15.



**Photograph 14** – View of wet area in late winter 2011, winter water cover was to extent of pegs placed in 2010. (Compare to Photograph 12)



**Photograph 15**– View of wet area in late winter 2011, winter water cover was to extent of pegs placed in 2010. (Compare to Photograph 13)

The surface water monitoring to date (December 2011) indicates that the surface hydrology waters are rapidly draining with temporary pools forming during precipitation events. The extent of surface water cover in 2011 (wet winter season) compared with 2010 (un-seasonally dry winter) indicates that surface water (cover/extent) patterns are not variable between drought seasons. Surface water monitoring will continue during 2012.

Surface water monitoring pegs will guide the drainage of the track construction to ensure that drainage infrastructure (pipes/culverts/drains) are located in these areas to avoid any pooling of watershed or disruption to water flows across the Gardner watershed area.

### 6.6. Wetland Assessment

The Subject Site is described as being part of the 2550 ha Doggerup Creek System which is listed in the Directory of Important Wetlands in Australia (ID WA104) (DEC, 2010; Department of Sustainability, Environment, Water, Population and Communities, 2010a). The system comprises extensive flats, Doggerup Lake, Lake Samuel, Lake Florence, Doggerup Creek, and a number of unnamed swampy areas (Department of Sustainability, Environment, Water, Population and Communities, 2010b).

The Directory listing describes the system as having wetland types:

- B1** Permanent rivers and/or streams
- B2** Seasonal or irregular rivers and/or streams
- B4** Riverine floodplains, river flats, flooded river basins, seasonally flooded grassland, savanna and palm savanna
- B5** Permanent freshwater lakes larger than 8 ha
- B10** Seasonal or intermittent freshwater ponds and marshes on inorganic soils, including sloughs, potholes, seasonally flooded meadows and sedge marshes
- B15** Peatlands; forest, shrub or open bogs

Natural Area Consulting undertook a wetland assessment in October 2010 (Appendix 5). The wetlands at the project site include:

- Permanent rivers and/or streams, less than 1 m wide and approximately 10 cm deep (wetland type B1), and
- Seasonal, shallow intermittent freshwater ponds, flooded meadows and sedge marshes on inorganic soils (wetland type B10).

The major wetlands within the project site are situated some 3+ km along the road reserve from Windy Harbour Road, and occupy approximately 1.4 ha in total. Of this, approximately 1700 m<sup>2</sup> (0.17 ha) is within the road reserve with the potential for disturbance, or 1.3% of the wetland area (NAC, 2011b).

The larger wetland areas are clearly identifiable from dryland locations based on vegetation, as they typically present vegetation associated with wet and/or waterlogged areas (Photographs 16 and 17), rather what are considered to be dryland species, such as the Jarrah (*Eucalyptus marginata*) and Karri (*Eucalyptus diversicolor*). The dryland areas have little to no open water bodies.





**Photograph 16** – Grasses and sedges within wetland areas, showing little of no open water. (NAC, 2011)



**Photograph 17**– Sedge marshes with little or no open water (NAC, 2011).

A flora and vegetation survey was carried out by Natural Area Consulting (NAC, 2011a) at the same time as the wetland assessment, and identified a range of wetland species within the two larger wetland areas, including:

A range of sedges and rushes and other damp area plants:

- *Baumea articulata*
- *Baumea juncea*
- *Evandra aristata*
- *Meeboldina scariosa*
- *Cyathochaeta clandestina*
- *Lepidosperma longitudinale*
- *Meeboldina denmarkia*
- *Meeboldina roycei*

A search of the Department of Environment and Conservation's Threatened Flora Database indicated that there is a probability of the species *Hypocalymma cordifolium* subsp. *minus* (P4) to occur within the vicinity of the major and minor wetland areas, but none was found (Natural Area Consulting, 2011a). While six (6) priority flora species were found during the survey only the *Goodenia filiformis* (P3) was found in the vicinity of the wetland areas, with a small population found on the damp soils (NAC, 2011).

Natural Area Consulting compared the wetlands within the Doggerup Road with nearby wetlands, including those listed in the Directory of Important Wetlands in the region to assess the potential degree of impact that may occur from the construction of an all-weather access track.

Natural Area Consulting concluded that:

*A review of available information and a visit to the proposed Project site indicates:*

- *Wetland areas on the site do not drain north to Doggerup Creek, but to the south east towards the Gardner River.*
- *There are no rare or endangered flora species or threatened ecological communities within the wetland area.*
- *The potential impact area is small, some 1.4 ha or 0.055% of the area known as the Doggerup Creek System of wetlands, or 10.8% of the gazetted road reserve area.*
- *The Project site is unlikely to provide suitable habitat for the vulnerable Balston's Pygmy Perch (*Nannatherina balstoni* regan 1906) (EPBC Act 1999 (Cwlth) and Wildlife Conservation Act 1950 (WA)) because of the presence of dense vegetated areas.*
- *There is the potential for the Subject Site to be suitable for the Priority 3 species *Galaxiella nigrostriata* (Black-striped Minnow) (Wildlife Conservation Act 1950 (WA), as water*

conditions and geology are similar to those in other locations within the broader Doggerup Creek System where there are known populations of the fish.

- The road reserve along a significant portion of its length is cleared, with further clearing likely to be minimal.
- There is a high likelihood of some impacts to vegetation within the areas covered by the wetlands, however it is also believed that through appropriate engineering or other design methods, these can be kept to a minimum.

(NAC, 2011b)

## 6.7. Flora

The subject is within the Warren IBRA bioregion. This bioregion is comprised of:

“...dissected undulating country of the Leeuwin Complex, Southern Perth Basin (Blackwood Plateau), South-west intrusions of the Yilgarn Craton and western parts of the Albany Orogen with loamy soils supporting Karri forest, laterites supporting Jarrah-Marri forest, leached sandy soils in depressions and plains supporting low Jarrah woodlands and paperbark/ sedge swamps, and Holocene marine dunes with *Agonis flexuosa* and *Banksia* woodlands and heaths”. (Hearn et al., 2002).

During the desktop assessment, Beard's Vegetation Classification dataset was found to classify the native vegetation on the subject site, as:

- 1) 1: Tall forest: Karri (*Eucalyptus diversicolor*);
- 2) 1144: Tall Forest; Karri and Marri (*Corymbia callophylla*)
- 3) 51: Sedgeland; reed swamps occasionally with heath;
- 4) 23 Low woodland; jarrah-banksia;
- 5) 990 Low forest; peppermint (*Agonis flexuosa*); and
- 6) 1109 Shrublands; peppermint scrub, *Agonis flexuosa*.

The Regional DEC Mapping Dataset (SLIP 2010) indicates the vegetation types and dominant species within the Regional landforms present on Doggerup Road, which are summarised in Table 10.

**Table 10 – Vegetation Units & Map Units (SLIP 2010)**

Map Code (SLIP)	Unit Name (SLIP)	Vegetation Type (SLIP)
254BrCOB	Collis brown limestone duplex	Marri-karri-jarrah tall open forest occurs with scattered <i>Banksia grandis</i> , <i>Allocasuarina decussate</i> , <i>Agonis flexuosa</i> and <i>Persoonia longifolia</i> and a shrub layer of <i>Acacia pentadenia</i> , <i>Bossiaia linophylla</i> , <i>B.aquifolia</i> , <i>Chorileana quercifolia</i> , <i>Chorizema illicifolium</i> and <i>Hovea ellipticum</i> . Jarrah-marri tall open forest occurs with scattered <i>Banksia grandis</i> , <i>Persoonia longifolia</i> and <i>Xylomelum occidnetale</i> , and a dense shrub layer of <i>Bossiaea linophylla</i> , <i>Xanthosia rotundifolia</i> , <i>Acacia spp.</i> , <i>Synaphea reticulate</i> and <i>Hakea spp.</i> Creepers include <i>Kennedia coccinea</i> , <i>Hardenbergia comptoniana</i> and <i>Cassytha glabella</i> .
254BrBWp	Blackwater podzols	Heath communities comprising of <i>Beaufortia sparsa</i> , <i>Pultenaea reticulata</i> , <i>Astartea fascicularis</i> , <i>Conospermum confertium</i> , <i>Kingia australis</i> , <i>Kunzea recurva</i> and <i>Homalospermum firmum</i> . There are also sedgelands of <i>Ghania decomposita</i> , <i>Anathria prolifera</i> , <i>A.scabra</i> , <i>Evandra aristata</i> , <i>Diaspasis filifolia</i> , <i>Leptocarpus scariosus</i> , <i>Lynsinea ciliatum</i> and <i>Scirpus nodosus</i> . Scattered <i>Nuytsia floribunda</i> and <i>Melaleuca presianna</i> may occur.
254WhCOB	Collis Brown limestone duplex	Marri-Karri-jarrah-tingle tall open forest occurs with scattered <i>Banksia Grandis</i> , <i>Allocasuarina fraseriana</i> , <i>Agonis flexuosa</i> and <i>Persoonia longifolia</i> , and a shrub layer of <i>Acacia pentadenia</i> , <i>Bossiaea linophylla</i> , <i>B.aquifolia</i> , <i>Chorileana quercifolia</i> , <i>chorizema illicifolium</i> and <i>Hovea ellipticum</i> .

Table 10 cont..

Map Unit Code (SLIP)	Map Unit Name (SLIP)	Vegetation Type (SLIP)
254NkMRf	Meerup podzols on interdune plains	Yate-bullich-banksia-native cedar paperbark woodlands and thickets. These can comprise of <i>Eucalyptus conuta</i> , <i>E.megacarpa</i> , <i>Banksia littoris</i> and <i>Agonis juniperina</i> , with a dense shrub layer of <i>Jacksonia furcellata</i> , <i>Angiozanthos flavidus</i> , <i>leucopogon australis</i> , <i>Hibbertia montant</i> and <i>Lepidosperma longitudinal</i> .
254NkMRs	Meerup podzols in siliceous sands	Marri-jarrah-bullich-yate-peppermint woodlands comprising of <i>E.megacarpa</i> , <i>E.conuta</i> , <i>Agonis flexuosa</i> , <i>Xylomelum occidentale</i> , <i>Banksia grandis</i> , <i>B.illicifolia</i> and <i>Allocasurina</i> , with dense ground cover of <i>Acacia pulchella</i> , <i>Jacksonia furcellata</i> , <i>Melaleuca thymoides</i> , <i>Macrozamia riedlei</i> and <i>Pultenea reticulata</i> .

(Source: SLIPs NRM Portal 2010)

A field survey of vegetation, flora and weeds was undertaken by Jacquie Milner (NAC) in October 2010 and February 2011 (Appendix 6). The field survey verified the desktop survey and provided a detailed assessment of the existing environment in the survey area and its relationship to adjoining areas.

A total of two hundred and thirty six (236) species were recorded in the survey area, including two hundred and twenty six (226) species of native plants and ten (10) weed species. Sixty five (65) of the native species were monocotyledons and one hundred and fifty seven (157) were dicotyledons. Of the non-flowering plants there were three (3) ferns and one (1) cycad. The most populous families were Myrtaceae with 22 species, Fabaceae (which now includes Acacia) with 22 species, Cyperaceae with 20 species, Proteaceae with 13 species and Ericaceae and Goodeniaceae both with 12 species each.

Ten species of weeds were present, mainly concentrated in the area of the Karri forest on the eastern side of the survey area. None of these species could be considered to have a significant presence (NAC, 2011a).




The vegetation condition was assessed within the road reserve and is regarded as being “degraded” in previously disturbed areas. Where regrowth has occurred (western portions of survey area) this was considered by NAC to be in “good condition”. The vegetation either side of the existing track was considered to be in “excellent condition” with very few weeds present. (NAC, 2011a).

Seven vegetation units can be described within the survey area. A description of each unit is given in Table 11.




Mapping displaying the range of the vegetation types as provided by Natural Area Consulting (NAC) is shown in Figures 12 (NAC 2011a, Figure 4a) and 13 (NAC 2011a, Figure 4b).




**Table 11 – Vegetation Units on site (NAC 2011a)**

Unit	Unit Description		Comments
<b>Ed</b>	Tall Closed <i>Eucalyptus diversicolor</i> forest over low closed forest of <i>Allocasuarina decussata</i> , <i>Hovea elliptica</i> , <i>Chorilaena quercifolia</i> and <i>Trymalium floribundum</i> .		
<b>EmCc</b>	Tall Open Forest of <i>Eucalyptus marginata</i> and <i>Corymbia calophylla</i> over a Tall Open Scrub layer with <i>Acacia urophylla</i> , <i>Hibbertia cuneiformis</i> , <i>Hibbertia furfuracea</i> , <i>Sida hookeriana</i> and various <i>Thomasia</i> species.		Photo courtesy of K. Kinnear.
<b>OH</b>	Open Heath of <i>Anarthria scabrum</i> , <i>Adenanthos obovatus</i> , <i>Acacia pulchella</i> , <i>Acacia hastulata</i> , <i>Calothamnus lateralis</i> , <i>Cyathochaeta clandestina</i> , <i>Dasypogon bromeliifolia</i> , <i>Hakea ceratophylla</i> , <i>Patersonia occidentalis</i> , <i>Diaspasis filiformis</i> and <i>Meeboldina denmarkica</i> .		



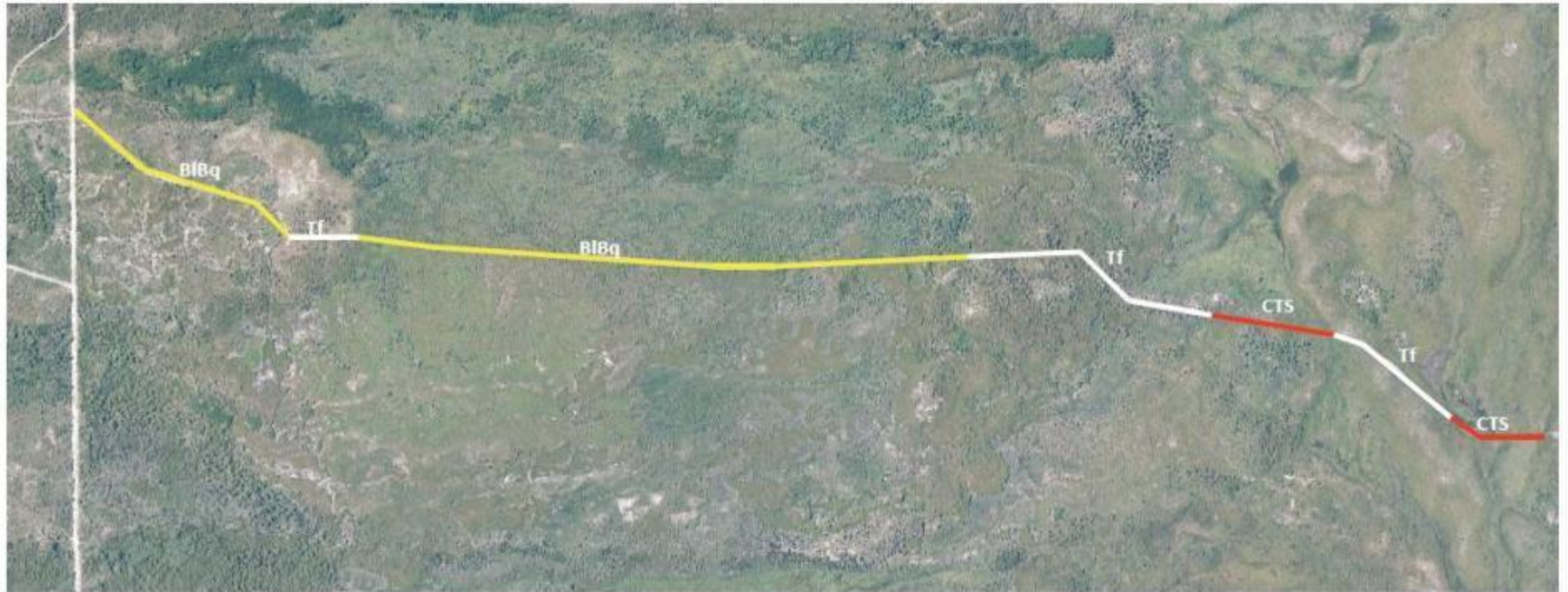
Unit	Unit Description		Comments
<b>Em</b>	Low Woodland of stunted <i>Eucalyptus marginata</i> growing over granite with <i>Anarthria scabrum</i> , <i>Hakea florida</i> , <i>Hakea linearis</i> , <i>Persoonia graminea</i> , <i>Xanthorrhoea preissii</i> , <i>Dasypogon bromeliifolius</i> , <i>Banksia nivea</i> and <i>Andersonia sprengelioides</i> .		Photo courtesy of K. Kinnear.
<b>CTS</b>	Wetland areas with Closed Tall Scrub of <i>Homalospermum firmum</i> , <i>Rhadinothamnus anceps</i> , <i>Astartea laricifolia</i> , <i>Baumea articulata</i> , <i>Evandra aristata</i> , <i>Meeboldina scariosa</i> , <i>Melaleuca pauciflora</i> , <i>Acacia divergens</i> , <i>Patersonia occidentalis</i> var. <i>occidentalis</i> and <i>Hibbertia perfoliata</i> .		Closed Tall Scrub in the largest wetland area of the survey.
<b>Tf</b>	Old, established dunes with a Low Open Forest of <i>Taxandria flexuosa</i> and <i>Banksia ilicifolia</i> with and understorey of Tall Open Scrub of <i>Jacksonia horrida</i> , <i>Acacia Cyclops</i> and <i>Macrozamia reidlei</i> .		<i>Jacksonia horrida</i> Tall Open Scrub.

Unit	Unit Description		Comments
BIBq	<p>Low Open Woodland of <i>Banksia littoralis</i> and <i>Banksia quercifolia</i> with a Closed Tall Scrub understorey of <i>Kunzea sulphurea</i>, <i>Leucopogon cordatum</i>, <i>Melaleuca densa</i>, <i>Taxandria juniperina</i>, <i>Taxandria parviceps</i>, <i>Beaufortia sparsa</i>, <i>Eutaxia myrtifolia</i>, <i>Aotus intermedia</i>, <i>Meeboldina roycei</i> and <i>Lepidosperma longitudinale</i>.</p>		

\_(Source: NAC, 2011a)



**Figure 12 – Vegetation Types Doggerup Road Reserve**



Natural Area  
Consulting  
99C Lord St,  
Whiteman, WA, 6068  
naturalarea.consulting.com.au  
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**Figure 4a**

Doggerup Road Reserve  
- Vegetation Types (west)

**Legend**

-  BIBq—Low Open Woodland
-  Tf—Low Open Forest
-  CTS—Closed Tall Shrubland

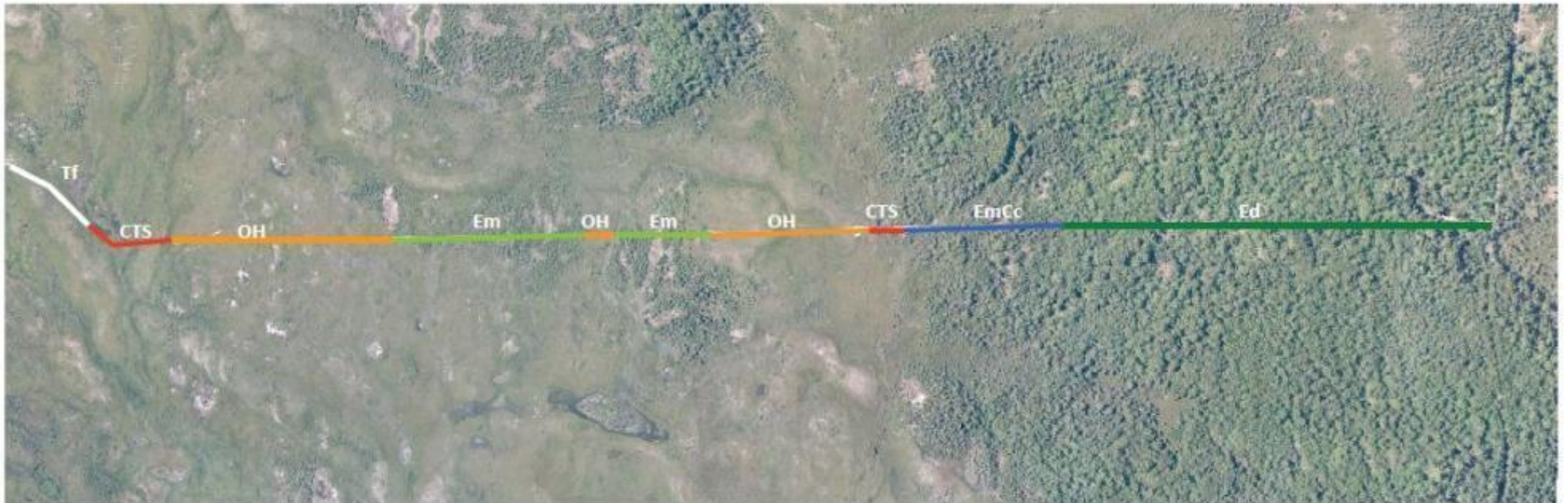
**Client**

Shellbay Holdings Pty Ltd



Created by: JGM  
Checked by: LS  
Drawing No: 02  
Date: February 2011  
Imagery Source: Landgate

**Figure 13 – Vegetation Types Doggerup Road Reserve**



**Legend**

-  Tf—Low Open Forest
-  CTS—Closed Tall Scrub
-  OH—Open Heath
-  Em—Low Woodland
-  EmCc—Tall Open Forest
-  Ed—Tall Closed Forest

**Client**  
Shellbay Holdings Pty Ltd



**N**

Created by: JGM

Checked by: LS

Drawing No: 02

Date: February 2011

Imagery Source: Landgate

**Figure 4b**

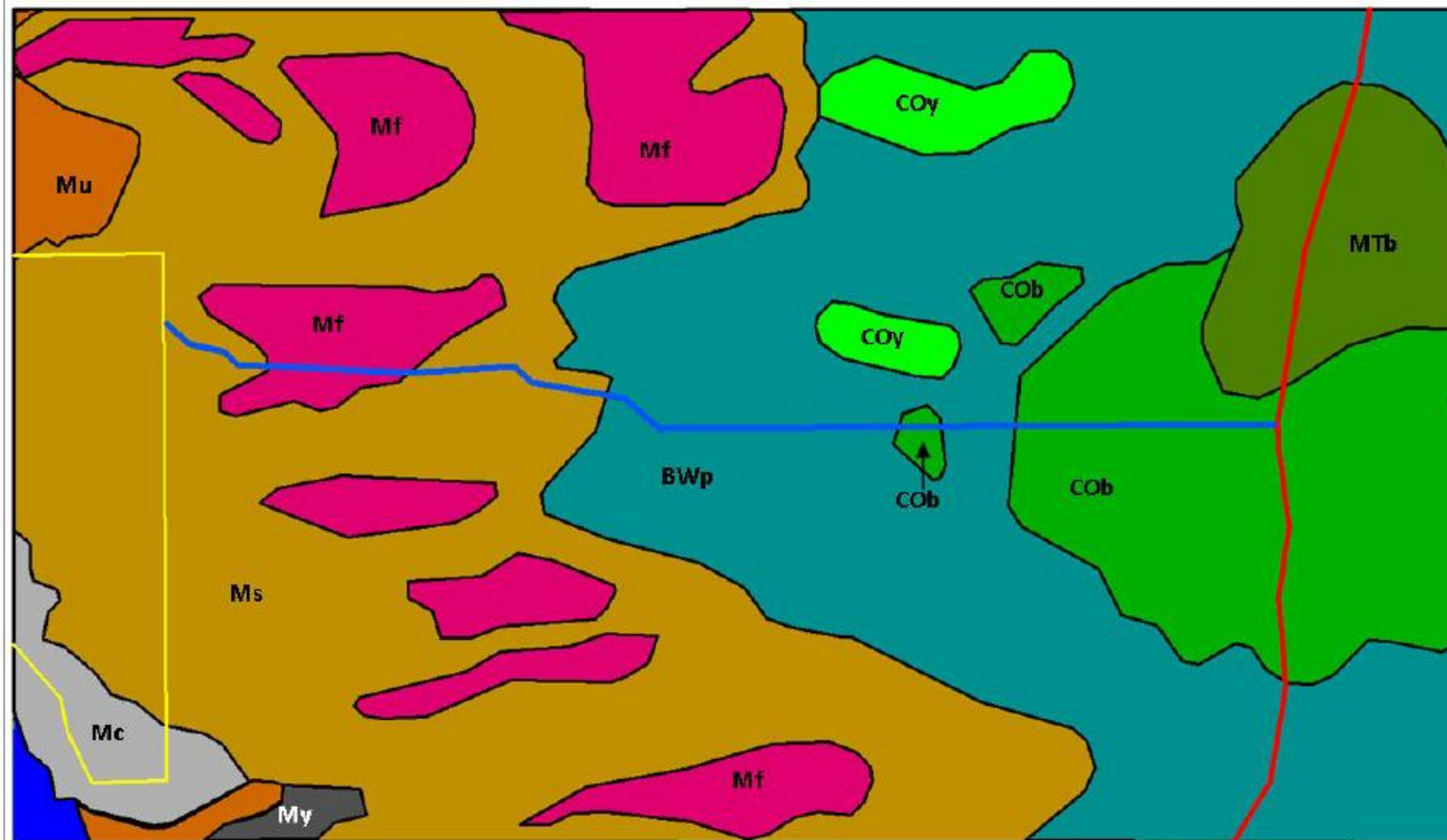
**Doggerup Road Reserve  
- Vegetation Types (east)**



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**Figure 14 – Regional Forest Agreement Vegetation Complexes adjacent to the Doggerup Road Reserve**



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**Figure 4c**  
**Regional Forest Agreement**  
**Vegetation Complexes**  
**Adjacent to the**  
**Doggerup Rd Reserve**

- |   |                |
|---|----------------|
|  | Mu—Meerup      |
|  | Mf—Meerup      |
|  | Ms—Meerup      |
|  | BWp—Blackwater |
|  | COy—Collis     |
|  | COb—Collis     |
|  | MTb—Mattaband  |

**Legend**

- |   |                      |
|---|----------------------|
|  | Wheatley Coast Rd    |
|  | Nelson Location 7965 |
|  | Survey Area          |
|  | Southern Ocean       |
|  | Mc—Meerup            |
|  | My—Meerup            |

**Client**  
**Shellbay Holdings Pty Ltd**



Created by: JGM  
Checked by: LS  
Drawing No: 06  
Date: August 2011  
Source: DEC, SLIPs NRM Portal

NAC (2011a) compared the vegetation complexes on site to the Regional Forest Agreement (RFA) as described by Mattiske and Havel (1998), (refer to Figure 14 NAC (2011a)) and determined that four complexes traverse the survey area:

- **Cob** – Collis brown gravelly duplex, includes surveyed vegetation units Ed, EmCc, Em,
- **BWp** – Black water podzols, includes surveyed vegetation units OH, CTS,
- **Mf** – Meerup podzols on interdunal plains, includes surveyed vegetation units BIBq, and
- **Ms** – Meerup podzols on siliceous sands, includes surveyed vegetation units Tf.

Aerial comparisons were undertaken of these vegetation complexes and the approximate area to be cleared for the all-weather access track was calculated (Table 12).

**Table 12 – NAC Aerial Comparisons of Vegetation Complexes**

RFA Vegetation Complex	Area (ha)	Area traversed in Survey (ha)	% Area of Vegetation Complex	Approx. area to be cleared (ha)	% Area of Vegetation Complex
COB	8330.34	3.32	0.04%	1.52	0.018
BWp	29666.16	4.17	0.01%	1.88	0.006
Mf	7284.54	1.63	0.02%	1.06	0.014
Ms	7618.40	3.42	0.04%	0.67	0.009

None of the vegetation complexes traversed by the survey area are considered to be under threat (Havel, 2002) at a local, regional or state level. Taking into consideration the area of the vegetation complexes known within the region and the expected extent of clearing required to formalise the tracks, the impact of the project will be low (NAC, 2011a).

The information as presented by Natural Area Consulting (Table 12 and Appendix 6) confirms that the impact of the proposal on regional significant flora vegetation types will be well below the “threshold level” of 30% (Environmental Protection Authority, 2000).

### 6.8. Threatened Flora

No species of Declared Rare Flora (DRF) was located within the survey area (NAC, 2011a). Six Priority species were located and threatened flora report forms lodged with the DEC. The Priority plant species located within the survey area are shown in Table 13, with locations shown in Figure 17 Draft Construction Plan.

**Table 13 – Records of Priority Flora by NAC**

Species	Priority	No of Plants Likely to be Affected by Track Creation
<i>Andersonia barbata</i>	P2	6
<i>Astartea sp. Scott River</i>	P4	1
<i>Goodenia filiformis</i>	P3	24
<i>Gonocarpus pusillus</i>	P3	5
<i>Hemiantra australis</i>	P3	35
<i>Stylidium leeuwinense</i>	P3	20

*Hypocalymma cordifolium* subsp. *minus* (P4) was listed in the DEC’s *Threatened (Declared Rare) Flora* database as being present on the eastern side of the large central wetland area but it was not located during this survey despite several intensive searches. The indicated area had been affected by fire and it is possible it has not regrown after this disturbance.

The analysis of local conservation significance of the flora and vegetation found that there were 9 species of significance, as highlighted in Table 14.

**Table 14 – Significant Flora found by NAC in Survey Area.**

Species	Endemic	Locally Endemic	Relictual Monotype	Range Extension
<i>Astartea sp. Scott River (P4)</i>		Y		
<i>Callistachys lanceolata</i>			Y	
<i>Chorilaena quercifolia</i>			Y	
<i>Diaspasis filiformis</i>			Y	
<i>Hemiandra australis (P3)</i>	Y			
<i>Homalospermum firmum</i>			Y	
<i>Leucopogon rubricaulis</i>				Y
<i>Schoenus submicrostachyus</i>				Y
<i>Xyris indivisa</i>		Y		

Natural Area Consulting noted that *Leucopogon rubricaulis* and *Schoenus submicrostachyus* are both on the western side of their currently known ranges and two species was considered locally endemic (*Xyris indivisa* and *Astartea sp. Scott River*).

### 6.9. Threatened Ecological Communities

Site surveys undertaken by Natural Area Consulting during the wetland (NAC, 2011b) and the flora and vegetation assessments (NAC, 2011a) revealed there are no Threatened Ecological Communities within the Doggerup Road Reserve survey area.

### 6.10. Dieback (*Phytophthora Cinnamomi*)

*Phytophthora cinnamomi* (*P.c.*) threatens over 2,300 (40%) different plant species in Western Australia. Once the pathogen infects the roots, the plant may begin to show symptoms of 'dying back', hence the common name used for the pathogen: Dieback.

Introduced following European settlement, *P.c.* is a soil-borne pathogen that kills a wide range of native plant species in the south west of Western Australia by attacking their root system. *P.c.* can also survive and reproduce on a wide range of native plant species without killing them. It has a widespread but discontinuous range in areas of the south west with an annual rainfall above 400 mm (Dieback Working Group, 2005).

Since the discovery of *P.c.* in the south-west of Western Australia (WA) (Podger *et al.* 1965), this introduced pathogen has become renowned for its unparalleled impact on flora biodiversity with 40% of the 5710 species in the South-west Botanical Province found to be susceptible and 14 % highly susceptible (Shearer *et al.* 2004).

Indigenous species most affected by *P.c.* belong to four families: *Proteaceae*, *Epacridaceae*, *Papilionaceae*, and *Myrtaceae*. Not all genera within a family, or all species within a genus, are necessarily susceptible. Indicator species used for interpreting in the Doggerup Road Reserve area included *Patersonia spp.*, *Banksia grandis*, *Banksia ilicifolia*, *Banksia littoralis*, *Banksia quercifolia*, *Jacksonia furcellata*, *Persoonia longifolia*, *Xanthorrhoea preissii*, *Podocarpus drouynianus*, *Leucopogon verticillatus*, *Leucopogon australis*, *Leucopogon capitellatus*, *Leucopogon concinnus*, *Leucopogon propinquus*, *Petrophile diversifolia*, *Adenanthos obovatus*, *Dasypogon bromeliaefolius*, *Andersonia caerulea*, *Hakea Spp* and *Macrozamia riedlei*.

The assessment to determine the presence of *P.c.* was undertaken by Moore Mapping in March 2011. The Linear method was used to map this area. Protectable and unprotectable areas have been identified to produce a Protectable Areas Map, for use in developing a *P.c.* Management Plan.

Disease mapping was carried out in accordance with the “*Phytophthora cinnamomi and the disease caused by it Volume II – Interpreter Guidelines for Detection, Diagnosis and Mapping*” (CALM, 2001 revised 2007) which cover the standard procedures to be used for interpretation and mapping of disease, caused by *P.c.* on department land, with outcomes provided in Appendix 7 (Moore Mapping, 2011).

*P.c.* was found to span a large portion of the area (3.7km) and was found to be in most of the swampy low lying areas, with the disease expression variable, ranging from obvious to subtle which was dependant on the age of infestation.(Moore Mapping, 2011). Moore noted that “..Some deaths, which may be contributed to *Armillaria*, were noted in the two uninfested sections.” An area statement provided by Moore Mapping summarises the extent of protectable and unprotectable areas, and is provided in Table 14 and shown in Figure 15.

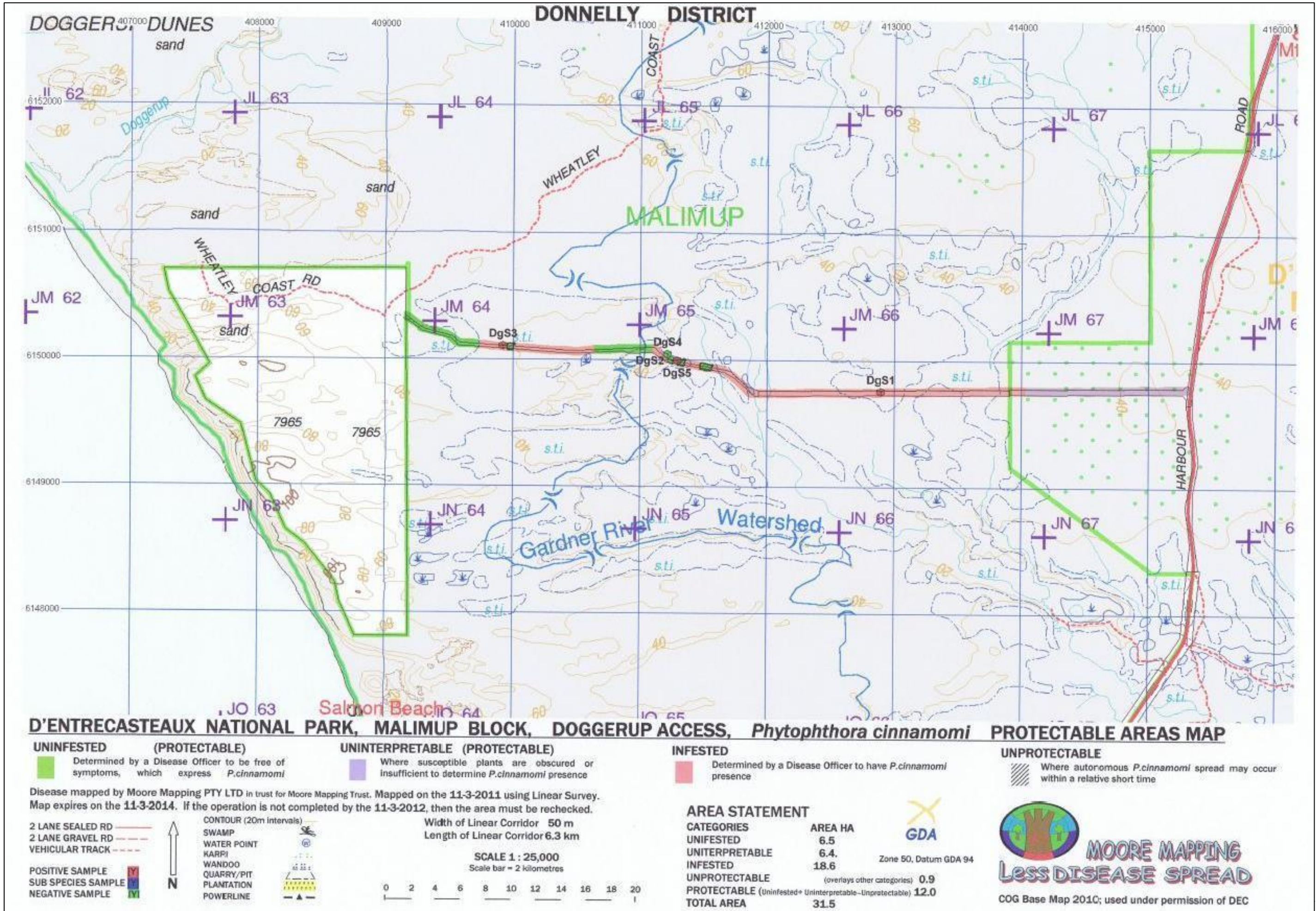
**Table 15 – Area Statement**

Categories	Area	Notes
UNINFESTED	6.5	
UNINTERPRETABLE	6.4	
INFESTED	18.6	
UNPROTECTABLE	0.9	overlays uninterpretable/uninfested
PROTECTABLE	12.0	uninfested + uninterpretable minus unprotectable
<b>TOTAL AREA</b>	<b>31.5</b>	

(Source: Moore Mapping, 2011)



Figure 15 - Protectable Area Map, Moore Mapping 2011





Three sections of track are deemed protectable by Moore Mapping (2011):

1. The uninterpretable section at the eastern end of the track, adjacent to Windy Harbour Road.
2. The uninfested section which straddles the Gardner River watershed.
3. The uninfested section at the western end of the track, adjoining the private property.

Three short sections of track are deemed unprotectable because their small size by Moore Mapping (2011):

- Two sections between the major creek crossing and the Gardener River watershed.
- To the west adjacent to where sample 3 was collected.

Laboratory testing was undertaken to verify the symptoms of *P.c.* disease. Moore Mapping (2011) reported:

*Five samples were taken for validation of disease symptoms within the mapped area, many of which were located on the brow of hills or small rises. Three of the samples returned P.c. positive. Sample two was re-sampled in the laboratory (which returned negative the second time), after which, two more samples were taken in the area, one of which returned negative and the other 30 to 40m from sample 2, returned positive. It is uncertain why it was difficult to obtain a positive in this area, other than perhaps the harsh conditions relating to its location on a sand dune ridge (free draining sand) and time of the year (end of Summer).*

Moore Mapping (2011) concluded that: *The total area within the 50m corridor of mapping deemed infested and unprotectable combined is 19.5 ha. The total of protectable areas is 12.0 ha.*

The *P.c.* Protectable Areas Map produced for the area has proposed age limits (Moore Mapping, 2011). Map boundaries should be checked before operations proceed if the map is older than one year (11/3/2012), and should not be used if it is older than three years since the original interpretation mapping (11/3/2014).

#### **6.11. Fauna**

Bio Diverse Solutions undertook a desktop vertebrate fauna assessment for the site in order to identify a composite list of species that might be found in the area and the species preferred habitats. A number of resources were reviewed including:

- DEC's Threatened Fauna database search for the area;
- A search of the DEWHA *EPBC Act* Protected Matters database;
- General texts including Chistensen *et al.* (1985, 1992) and How *et al.* (1987);
- A number of published and unpublished reports for fauna surveys completed in the region;
- Western Australian Museum records; and
- Verbal communication with Ian Wilson (DEC, 2010) and Peter Mawson (DEC, 2011).

Wilson (2010) considers that the Doggerup Road Reserve may contain significant habitat for birds such as the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) and Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*). Wilson also indicated that possible mammal fauna within the survey area may include *Isoodon obesulus fusiventer* (Southern Brown Bandicoot), *Pseudocheirus occidentalis*, (Western Ringtail Possum), *Trichosurus vulpecula* (Brushtail Possum), *Cercartetus concinnus* (Western pygmy Possum) and *Tarsipes rostratus* (Honey Possum). The site may also provide suitable habitat for the Quokka (*Setonix brachyurus*).

Kinnear (2011) recorded opportunistic observations of vertebrate fauna whilst undertaking a Level 1 fauna assessment and assisting with a Level 2 vegetation and flora survey of the site during October 2010 and February 2011.

Habitat trees and fauna site assessment was carried out on Tuesday and Wednesday the 2<sup>nd</sup> and 3<sup>rd</sup> February 2011 by Kathryn Kinnear and Dan Debunnetat of Bio Diverse Solutions. A total of 29.5 person hours were spent conducting several walked transects (total 6.5 km) and night time spotlighting along the Doggerup Road Reserve track searching for possible habitat trees, Quenda diggings and runnels, cockatoo chewed eucalypt or proteaceous fruit and Ringtail Possum dreys and scats . All signs and possible habitat trees were recorded with a GPS coordinate. Survey was undertaken during daylight and night time hours (spotlighting).

During the February 2011 field survey, all possible habitat trees (>500mm in Karri and 250mm diameter in all other trees) were flag taped, logged in a GPS and photographed. Species of trees included *E.diversicolour*, *E.marginata*, *C.Calophylla*, *B.littoralis*, *Taxandria juniperina*, and *Melaleuca raphiophylla*. Associated dominant midstorey species were recorded and a database developed for the survey area. A total of 66 habitat trees were identified during survey, with outcomes provided in Appendix D of the Fauna Report provided at Appendix 8.

#### 6.12. EPBC Listed Terrestrial Fauna

The *EPBC Act* provides for the protection of threatened species considered to be matters of national environmental significance, as well as providing the mechanism for Australia to fulfil its responsibilities under international conventions and/or treaties such as but not limited to the RAMSAR Wetland Convention and the Japan Australia Migratory Bird Agreement (JAMBA).

The Carnaby's Cockatoo is listed as Schedule 1 (Endangered) under the *WAWA Act*, and as Endangered under the *EPBC Act*.

Migratory wetland birds such as the Great Egret (*Ardea alba*) and the Cattle Egret (*Ardea ibis*) may find the shallow depth of the wetlands suitable for wading in their hunt for food, however the presence of significant amounts of emergent vegetation within the Project area is likely to mitigate against this.

According to the Department of Sustainability, Environment, Water, Population and Communities (2010b), seven fish species are known from various locations within the broader Doggerup Creek System. These are:

- *Bostockia porosa*
- *Edelia vittata*
- *Galaxias occidentalis*
- *Galaxiella munda* (Western Mud Minnow) (WCAWA Vulnerable)
- *Galaxiella nigrostriata* (Black-striped Minnow) (Priority 3)
- *Lepidogalaxias salamandroides* (Salamander Fish)
- *Nannatherina balstoni* (Balston's Pygmy Perch) (Rare)

Of these, the Balston's Pygmy Perch is listed as rare, likely to become extinct under the Department of Environment and Conservation's listing of threatened species (DEC, 2010) and vulnerable under the *EPBC Act*. The Black-Striped Minnow is listed as a Priority 3 species under the *Wildlife Conservation Act 1950 WA* (WCAWA), which means it is a poorly known species that has been found in several locations, but it is not believed to be under immediate threat of extinction. The Western mud Minnow (*Galaxiella munda*) is listed as Vulnerable under the WCAWA, which means it is Species listed in Schedule 1 as Vulnerable. A copy of the DEC Threatened Fauna database search (as provided by DEC 2010) is provided in Appendix G.

A list of threatened fauna species predicted to occur and their likelihood of occurring at Doggerup Road is provided in Table 16.



**Table 16 – DEC Threatened Fauna Summary**

Species	Common Name	EPBC	Migratory	WAWC	Priority Listing	Likelihood of occurring in subject area
<b><u>DEC Threatened Database</u></b>						
<i>Austroassiminea lethra</i>	Cape Leeuwin Freshwater Snail			VU		Low
<i>Calyptorhynchus banksii subsp. naso</i>	Forest Red-tailed Black-Cockatoo	VU		VU		High
<i>Calyptorhynchus baudinii</i>	Baudin's Cockatoo	VU		VU		High
<i>Galaxiella munda</i>	Western Mud Minnow			VU		Low
<i>Galaxiella nigrostriata</i>	Black-striped Minnow				3	Moderate
<i>Lagostrophus fasciatus subsp. fasciatus</i>	Bernier Is. Banded Hare-wallaby			VU		Low
<i>Macronectes giganteus</i>	Southern Giant Petrel	VU	X	VU		Moderate
<i>Nannatherina balstoni</i>	Balston's Pygmy Perch	VU		VU		Moderate
<i>Setonix brachyurus</i>	Quokka	VU		VU		High
<i>Isoodon obesulus subsp. fusciventer</i>	Southern Brown Bandicoot, Quenda				5	High
<i>Charadrius rubricollis</i>	Hooded Plover				4	Low
<i>Falsistrellus mackenziei</i>	Western False Pipistrelle				4	Moderate
<i>Galaxiella nigrostriata</i>	Black-stripe Minnow				3	Moderate
<i>Fibulacampus bisetosus</i>					2	Low
<i>Pseudocheirus occidentalis</i>	Western Ringtail Possum	VU		VU		High
<b><u>Additional EPBC Listed Species</u></b>						
<i>Leipoa ocellata</i>	Malleefowl	VU				Low
<i>Botaurus poiciloptilus</i>	Australasian bittern	VU				Low
<i>Dioedeia exulans gibsoni</i>	Gibson's Albatross	VU				Low
<i>Macronectes halli</i>	Northern Giant Petrel	VU				Low
<i>Thalassarche cauta cauta</i>	Shy Albatross	VU				Low
<i>Dasyurus geoffroii</i>	Chuditch, Western Quoll	VU				Low-moderate
<i>Apus pacificus</i>	Fork-tailed Swift	VU				Low-moderate
<i>Haliaeetus leucogaster</i>	White Bellied Sea Eagle	VU				Low-moderate
<i>Merops ornatus</i>	Rainbow Bee-eater	VU				Moderate

The findings from the preliminary fauna assessment deemed that the highest risk of disturbance to threatened fauna is habitat trees for Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) and the Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*). A total of 66 Habitat trees (500mm in Karri and >250mm in other trees) were identified during survey. It is proposed as part of the design of the 3m all-weather access track that these trees will be avoided during construction of the track. The sparse nature of the site, previous disturbances (fire and clearing) and small footprint of the track itself will result in low amounts of disturbance to these possible threatened fauna species and habitat.

There is a moderate risk that the *Nannatherina balstoni* (Balston's Pygmy Perch) and *Galaxias nigrostriata* (Black-stripe minnow) species occurs within the wetlands of the Doggerup Road Reserve. However the risk of disturbance is anticipated to be low by this project, as the Engineering Specification has been designed to ensure there is minimal footprint of the track and clearing within wetland areas. Hydrological flows will not be altered to ensure this and other aquatic species are not affected by this project (MPM Development Consultants, 2010, Kinnear, 2011).

The Western Mud Minnow (*Galaxias munda*,) has a low probability of occurring, although NAC, (2011) reported the wetlands site is suitable, Morgan *et al* (1998) did not report this species (*Gm*) within 5 km of the subject area, giving a low probability of the fish occurring upstream of the historical survey sites.

All other species were considered to have a low probability of occurring in the subject area.

## 7. Existing Social Environment

### 7.1. Native Title and Aboriginal Heritage

The subject site is located within the Native title claim of the South West Boorah Claimants (Tribunal File Number WC98/63) represented by the South West Aboriginal Land and Sea Council. A search of the Native Title Tribunal Database revealed that this claim status is "Finalised – Dismissed" (refer Appendix 9).

Indigenous occupation of the south coast of Western Australia is inadequately recorded but is evident from discarded artefact materials and middens of shells of edible marine creatures. Some of the most important known indigenous sites in the D'Entrecasteaux National Park have been identified, and recommendations have been made for their management. A search of the DIA heritage database revealed there are no registered sites recorded within the subject area.

A search of the Department of Indigenous Affairs (DIA) Heritage Inquiry Database revealed that there are 4 listed Aboriginal Heritage Sites adjacent to the subject area (refer Appendix 9). These include:

- Northcliffe (5777),
- Blackwater (5858),
- Nookanellup Burial site (20144), and
- Salmon Beach Stone Arrangement (21591).

A Department of Indigenous Affairs recommended Heritage Consultant (Wayne Webb) undertook provisional heritage assessment during February 2011. A sweeping search on foot was undertaken for the length of the Doggerup Road Reserve. Webb (2011) stated through verbal advise that that there were no probable heritage sites located within the Doggerup Road Reserve and was unaware of any heritage issues that would be impacted from the proposal. He later discussed the matter with the South West Boodjara Working Party which speak for the Windy Harbour area, whereby some concerns were raised regarding the project.

Some of the concerns as outlined by the Working Party include:

- The threat of *P.c.* & disturbance to such a pristine swampland area;
- The Impact of using bore water, sewerage concerns and the impact of roads leading to places of significance & fragile coastal dunes; and
- With it's (the Subject Site) proximity to Chudalup, the many other mythological & archaeological sites nearby and with the dune systems possibly containing skeletal remains, the people are opposed to any further development in and around the Windy Harbour area.

Ongoing consultation is occurring with the Working Party which speak for the Windy Harbour area, and will continue throughout the project lifespan. The consultation phase has been initiated with the South West Boodjara Working Party and their concerns and management responses will be documented in an updated EMP prior to construction activities occurring.

### 7.2. Heritage and Conservation areas

D'Entrecasteaux National Park has long been valued for its rugged coastlines, beaches and dune systems as well as extensive and nationally significant wetland systems that provide habitat for a range of endemic flora and fauna (CALM, 2005). Management of 4-wheel drive tracks and old access tracks are problematic to the DEC due to illegal activities such as motorbikes, unapproved 4-wheel driving and other nuisance access problems. Illegal access into national parks is also a concern due to the potential spread of *P.c.* (*Phytophthora cinnamomi*), localised destruction of native endemic flora, disturbance to fauna and degradation to soils. The D'Entrecasteaux National Park has controlled access into the park from Windy Harbour to the south of the subject site (Salmon Beach Access) and via Summertime Track to the north (4-wheel drive access) of the Doggerup Road Reserve.



The *Draft Shannon D'Entrecasteaux National Park Management Plan* (2005) outlines that Nelson Location 7965 is not of high priority to be acquired by the government (Map 3 CALM 2005) and that the Tenure recommendations are:

*Negotiating with private property owners, Main Roads Department and local authorities to ensure that road reserves to park enclaves are best located to protect environmental and landscape values of the parks and satisfy owners access requirements.*

The Draft Management Plan also states:

*When implementing road developments, Main Roads WA and the local authorities are required to undertake the necessary environmental impact assessments according to the Environmental Protection Act, the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 and the Wildlife Conservation Act.*

(CALM 2005)

Windy Harbour is one of the biggest tourist and recreational sites along the Augusta-Walpole coastal strip in terms of formalised use adjacent to the national park. It is a site with longstanding use and a strong history of community management. Windy Harbour has a caravan park, playground facilities, boat launching, leasehold housing and gravel road networks (refer to Photographs 18 and 19).



**Photograph 18** – View of Windy Harbour settlement, 3km south of subject site.



**Photograph 19** – View of Windy Harbour settlement, showing recreation playground.

Windy Harbour has a long history as a place for low-cost, family focused holidays by the coast. The Windy Harbour reserve is under the management of the Shire of Manjimup. The future planning for the reserve is guided by the *Windy Harbour Management Plan 2007- 2017* which was prepared in 2006 on behalf of the Shire of Manjimup. (WAPC, 2009)

Given this context, it is believed that this project will have no impact on the existing social environment at Windy Harbour townsite. As the proposed track shall be a “Controlled Closed Road” it is predicted to be little to no impact on adjacent Conservation areas.

## 8. Summary of Potential Environmental Impacts, their Significance and Management Responses.

This section outlines the potential environmental impacts associated with the project, along with an assessment of their degree of significance and how they will be managed. For each type of impact, the EPA objectives will be provided, relevant policies, guidelines and standards listed, likely impacts described, and how they will be managed.

### 8.1. Wetlands, Groundwater and Surface Water

#### **EPA objectives**

- *To protect the environmental values and functions of wetlands in Western Australia;*
- *To protect, sustain and, where possible, restore the biological diversity of wetland habitats in Western Australia;*
- *To protect the environmental quality of the wetland ecosystems of Western Australia through sound management in accordance with the concept of 'wise use', as described in the Ramsar Convention, and ecologically sustainable development principles, regardless of land use or activity;*
- *To have as an aspirational goal, no net loss of wetland values and functions;*
- *To maintain the quantity of water (surface and ground) so that existing and potential environmental values, including ecosystem maintenance, are protected;*
- *To ensure that the quality of water emissions (surface, ground, and marine) does not adversely affect environmental values or the health, welfare and amenity of people and land uses, and meets statutory requirements and acceptable standards.*

#### **8.1.1. Relevant Policies, Guidelines and Standards**

The EPA has published a number of policies and guidelines relating to the identification and management of potential impacts on wetlands. These include:

- *Environmental Protection Act 1986; and*
- *EPA Guidance Statement No 33 Guidance for Planning and Development May 2008.*

#### **8.1.2. Potential Impacts**

The Subject site is described as being part of the 2550ha Doggerup Creek System which is listed in the Directory of Important Wetlands in Australia (ID WA104) (DEC, 2010; Department of Sustainability, Environment, Water, Population and Communities, 2010a). The system comprises extensive flats, Doggerup Lake, Lake Samuel, Lake Florence, Doggerup Creek, and a number of unnamed swampy areas (Department of Sustainability, Environment, Water, Population and Communities, 2010b).

Wetland information recorded by the DEC (2010) and in the *Directory of Important Wetlands in Australia* (Department of Sustainability, Environment, Water, Population and Communities, 2010a) and DEC Geomorphic Wetlands Augusta to Walpole (2003), indicate the Subject Site is part of the broader Gardner Watershed System further within the Shannon River hydrographic catchment (Department of Fisheries, 2010), and within the local catchment of the Gardner River.

According to the Department of Sustainability, Environment, Water, Population and Communities (2010b), seven fish species are known from various locations within the broader Doggerup Creek System. The wetlands and creek system may form suitable habitat for fish species as outlined in Section 8.4.

To the north and to the west of the site are a series of parabolic dunes that acts to define the micro-catchment that feeds the wetland areas crossing the Doggerup Road Reserve. Water within the two major wetland areas in and near the project site drain south east towards the Blackwater Creek, which ultimately feeds into the Gardner River to the south east, with the topography at the site precluding water draining into Doggerup Creek to the north west.

Potential impacts include:

- Fragment the Gardner watershed wetland system and cause compaction and alteration of the sub-surface hydrology;
- Protection of ecological and hydrological role of wetlands within Doggerup Road and adjacent ESA;
- Disturbance to shallow basins with intermittent wetlands community structure and composition, alteration to basin structure and
- Potential disturbance to hydrological function.

### **8.1.3. Proposed Management and Mitigation**

The engineering specification has been designed to minimise disturbance to wetland function, fauna and vegetation, these include:

- Installation of site specific pipe culverts over water crossings;
- Detail on construction methodology and generic cross sections detail of culvert construction;
- Use of multiple culverts to ensure water flows are not restricted by track development;
- No excavation of soils in wetland areas;
- No vegetation clearing in wetland areas;
- Grading of the track to a crowned surface or at cross fall to suit natural slope, small off shoot drains if required; and
- Passing lanes/turn around areas confined to existing cleared areas or where minimal vegetation removal is required, no passing lanes at wetland areas.

The existing terrain is slightly undulating with minimal cross fall, therefore the need to provide road side drains is not considered necessary (MPM 2010). Water will be infiltrated as close as possible to the point where it fell rather than directing it to the nearest low point. The drainage associated with the track is assisted by minimising the track footprint, where less water is generated (catchment area) and combined with the absolute minimum vegetation clearing, the water generated is not directed towards bare areas of soil but into the existing vegetation, significantly reducing the potential for erosion issues.

The existing/proposed water crossings are all generally at 90 degrees to the direction of water flow, which will mean the track will not have to divert water out of the road. This will considerably reduce the extent of existing vegetation disturbance and therefore any clearing that may have been required to facilitate a perpendicular and level water crossing. In order to ensure that an all-weather access is provided, it is proposed to increase the thickness of limestone road base to a minimum 500mm at water crossings. Constructing the crossings out of limestone will ensure that any earthworks required are minimised, as the existing material will not be disturbed.

Measures to manage hydrological function and site environmental management will be implemented through the EMP. These will include:

- Limiting initial disturbance areas,
- Undertake all work in dry soil conditions and in driest time of the year;
- Briefing of all machine operators prior to commencement of works of the Engineering specification and minimal disturbance to wetland areas;
- Ensure all vehicles and equipment are cleaned/washed down prior to mobilising to site,
- Restricting vehicles to established trafficable areas; and
- No soil movement in wetland areas, thereby not disturbing any Potential Acid Sulfate Soils;
- Implement hygiene and weed management controls with briefing to all site workers upon entry to Road Reserve.

### **8.1.4. Potential Outcomes**

The potential outcomes from the implementation of the above actions are anticipated to be:

- Minimal disturbance to wetland areas and hydrological flow;
- No disturbance to groundwater or Acid Sulphate Soils;



- Localised disturbance to wetland in short term, with return to function in the long term as little vegetation will be disturbed and aquatic fauna will be able to move through the wetland areas;
- No disturbance to adjacent ESA area, confined to Road Reserve area; and
- No adverse impact to Gardner Watershed wetland functions or flows.

## 8.2. Vegetation and Flora

### **EPA objective**

*The EPA's objective for flora is to maintain the abundance, diversity, geographic distribution and productivity of flora at the species and ecosystem levels through the avoidance or management of adverse impacts and through improvement in knowledge.*

### **8.2.1. Applicable Policies, Guidelines and Standards**

EPA Position Statement No 2: *Environmental Protection of Native Vegetation in Western Australia*, (2000) provides an overview of the EPA position on the clearing of native vegetation in Western Australia. Under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*, clearing native vegetation is prohibited unless:

- A clearing permit is granted by the DEC;
- The clearing is for an exempt purpose under Schedule 6 of the regulations; or
- A proposal formally assessed by the EPA.

Native vegetation clearing proposals in Western Australia are assessed against Ten Clearing Principles outlined in Schedule 5 of the *Environmental Protection Amendment Act 2003*. These principles aim to ensure that all potential impacts resulting from removal of native vegetation can be assessed in an integrated way.

The principles address three main environmental areas:

- Biodiversity significance;
- Land degradation; and
- Ground and surface water quality.

The DEC's *Guide to the Assessment of Applications to Clear Native Vegetation under Part V of the EP Act 1986* (April 2009) provides guidance on clearing assessment against the Ten Clearing Principles.

### **8.2.2. Potential Impacts**

An assessment of the proposal against the Ten Clearing Principles has been made, refer to Table 17. In summary, the proposal is not considered by the proponents to be at variance with any clearing principles.

**Table 17– Ten Principles of Clearing**

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

<b>Proposal is not significantly at variance with this Principle</b>	
<b>Comments</b>	The proposed clearing area is not within a “Biodiversity Hotspot for Priority Action” as denoted by the Commonwealth Threatened Species Committee. In accordance with the DEC (2009) significant flora can be an indicator of high biological diversity. No species of Declared Rare Flora was located. Six species of Priority Flora were recorded on site. As priority species that that are known from a small number of populations that are recognised as not being under immediate threat, the impact on the broader population is considered to be low. Nine flora species of significance were recorded, with one species considered locally endemic ( <i>Xyris indivisa</i> ). The Fauna Assessment indicates that no Threatened Species would be affected from the track construction, with habitat trees retained and avoided during construction. The linear nature of the project and the previous clearing disturbances will have minimal impact on local diversity.
<b>Methodology</b>	Flora Survey NAC (2011) Fauna Survey BDS (2011) Wetland Assessment (2011)

**(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.**

<b>Proposal is not at variance to this Principle</b>	
<b>Comments</b>	All habitat trees to be retained, minimal disturbance to wetland areas and maintenance of hydrological flows.
<b>Methodology</b>	Fauna Survey BDS (2011) Wetland Assessment (2011) Engineering Assessment

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

<b>Proposal is not at variance to this Principle</b>	
<b>Comments</b>	No Declared Rare Flora was recorded on the site during the flora survey. Six species of Priority Flora were recorded on site. As priority species that that are known from a small number of populations that are recognised as not being under immediate threat, the impact on the broader population is considered to be low. Nine flora species of significance were recorded, with two species considered locally endemic ( <i>Xyris indivisa and Astartea sp. Scott River</i> ). Priority Flora and Species of Significance to be avoided where possible. <i>Xyris indivisa and Astartea sp. Scott River</i> will be located and avoided prior to commencement of works. Footprint of clearing to be to minimal extent necessary.
<b>Methodology</b>	Flora Survey NAC (2011) EMP (2011)

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

<b>Proposal is not at variance to this Principle</b>	
<b>Comments</b>	The native vegetation within the site does not comprise the whole, or part of, or is necessary for the maintenance of, a Threatened Ecological Community.
<b>Methodology</b>	Flora Survey NAC (2011) Wetland Assessment (2011)

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

<b>Proposal is not at variance to this Principle</b>	
<b>Comments</b>	The site has not been extensively cleared and has sound vegetation representation in Vegetation Complexes. The impact of the proposal on regional significant flora vegetation types will be below the “threshold level” of 30% (Position Statement No.2 EPA 2000).
<b>Methodology</b>	Flora Survey NAC (2011)

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

<b>Proposal is not likely to be at variance to this Principle</b>	
<b>Comments</b>	Creek and wetland areas will have minimal disturbance with track “floated”, no vegetation clearing proposed in these areas. Approximately 1700 m <sup>2</sup> (0.17 ha) is within the road reserve with the potential for disturbance, or 1.3% of the wetland area. Impacts on wetland and hydrology deemed low through Engineering specification and minimal footprint of track.
<b>Methodology</b>	Wetland Assessment (2011) Engineering Assessment (2010)

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

<b>Proposal is not at variance to this Principle</b>	
<b>Comments</b>	There are no ASS soils present on site and avoidance of wetland soils will ensure that any acid conditions area not disturbed into any adjacent waterways. The Engineering specification (MPM 2010) outlines details to ensure there is no scour erosion and degradation from the works. The EMP outlines rehabilitation measures of any exposed areas with site topsoil, brush and/or matting if required.
<b>Methodology</b>	Engineering Assessment (2010) EMP (2011)

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

<b>Proposal is not likely to be at variance to this Principle</b>	
<b>Comments</b>	Impacts are expected to be localised and within the 20m Road Reserve. The adjacent D’Entrecasteaux National Park is not anticipated to be affected by this proposal. The minimal footprint of the track specification and the Engineering proposal will ensure that any affects are local and short term within the Doggerup Road Reserve area. The Environmental Management Plan outlines techniques to ensure there is no disturbance to adjacent lands and minimal disturbance within the Road Reserve
<b>Methodology</b>	Engineering Assessment (2010) EMP (2011)



**(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.**

Proposal is not at variance to this Principle	
<b>Comments</b>	No disturbance to ground water is proposed, all development should be being carried out in late summer (dry) conditions. Surface water flows will not be interrupted with work undertaken in driest period. Post construction hydrological flows will equal pre-development and surface water movements.
<b>Methodology</b>	Engineering Assessment (2010) EMP (2011) Wetland Assessment (NAC 2011)

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

Proposal is not at variance to this Principle	
<b>Comments</b>	The engineering specification outlines how to “Float” the road across wetland areas, with no clearing of vegetation in these areas. Concrete reinforced pipework and, sandbagging and culvert design to ensure flows are maintained. The track will not cause flooding to any adjacent areas.
<b>Methodology</b>	Engineering Assessment (2010) EMP (2011) Wetland Assessment (NAC 2011)

The following likely impacts can therefore be identified as part of this proposal:

- Clearing of Native Vegetation resulting in loss of some Priority Plant species and Flora of Significance;
- The clearing of vegetation that may be important to significant fauna on site;
- An increased risk of weed and P.c. spread due to construction activities and increased access; and
- Temporary localised disturbance to wetlands.

The total area proposed for the construction of the track is 6.5ha, of this total amount 1.9 ha has been previously disturbed and vegetation in wetland areas is proposed not to be removed. The batters and disturbed areas not remaining for access along the track or for drainage will be revegetated using site topsoil or mulched vegetation. A small footprint is proposed for the track construction; therefore minimal bare areas are anticipated.

EPA Position Statement No 2: *Environmental Protection of Native Vegetation in Western Australia*, (2000) identifies that clearing for a project should not compromise any vegetation type by taking it below the “threshold level” of 30% of the pre-clearing extent of any vegetation type. This project is not above that threshold for any of the vegetation types present.

It is expected that some species of *Andersonia barbata*, *Stylidium leeuwinense* and approximately 60 plants of *Hemiandra australis* may be disturbed as these species are on the middle of the existing disturbed track. Plants will be positively identified and avoided where possible, species of significance to be avoided where possible, *Xyris indivisa* and *Astartea sp. Scott River* will be located and avoided prior to commencement of works.

### 8.2.3. Environmental Mitigation and Management

The following management measures have been incorporated into the Engineering Specification to reduce the likelihood of impacts to vegetation and flora:

- Minimal footprint of clearing vegetation, keeping to disturbed areas;

- ‘Floating’ the track over wetland areas with stabilisation to culverts with concrete sandbagging;
- Turnaround areas and passing lanes to be restricted to cleared areas and not in waterways; and
- Installation of >250mm diameter concrete re-enforced pipes to ensure hydrological flows are maintained in wetland areas for fish species.

The EMP outlines specific reference to management of flora, with site management measures to be employed such as:

- Environmental Officer to undertake site survey and identification of species 2 weeks prior to works commencing, positively identify species and locations (GPS locations as supplied by NAC Flora Specialists);
- Undertake briefings with all site personnel to avoid populations, a minimum of 10m buffer to apply where possible;
- Periodic site survey to ensure there is minimal impact to species; and
- Where species cannot be avoided (ie *Hemiandra australis*), limit extent of disturbance and steepen track batters to ensure minimal disturbance to species, hand transplant plants where able to adjacent areas.

A draft Construction Management Plan showing Priority Flora locations is shown in Figure 17 (a-c). This will guide the development of the

#### **8.2.3.1. Dieback Management Plan**

Dieback refers to *Phytophthora*, a plant disease that impacts on remnant vegetation. Disease is a potential problem when equipment is brought to the site from a P.c. infected area or soil material is moved and increases the spread of the disease. This project aims to ensure there is zero spread of disease through the avoidance or management of adverse impacts. A

The Dieback assessment determined the extent of “*Phytophthora cinnamomi*” (*P.c*) disease along the Doggerup Road Reserve. The area is known for its high vegetation values and susceptibility to P.c. disease due to vegetation type and high rainfall.

Potential impacts include:

- Spread of *P.c* impacting wetland species, fragile plant communities and native vegetation within ESA; and
- Loss of biodiversity and local loss of species from spread of *P.c*. from road construction activities.

All vehicles and equipment to be used on site for clearing and land reinstatement will be brushed/high pressure or hosed down prior to entering the site at a designated hygiene area. Brush bays areas are located on entry to the site near Windy Harbour Road and in consultation with the DEC. Any brushdown material will be bunded and collected on-site and disposed to green waste.

All clearing and construction operations are to be carried out in dry soil conditions only.

Site operational management maps to be prepared for dissemination to Site Project Manager and Site Supervisor by the Environmental Officer prior to commencement of works detailing brush down areas, demarcation, turnarounds and any other hygiene management requirements after site walk over with DEC officers.

#### **Aim of Hygiene Plan**

The aim of this plan is to ensure there is zero spread of Phytophthora disease into uninfested areas of D’Entrecasteaux National Park. This plan will document the management measures for successful completion of the project in terms of education to personnel, decontaminating equipment, and defining access measures.

## **Demarcation**

Where P.c. infestations share the same boundaries with protectable forest, these boundaries are demarcated using a double band of “Day-glow orange” flagging tape, both on the track edge and 10 to 25m in from the edge.

Knots in the tape are placed facing towards the infestation, with a variable buffer width >15m from the infestation.

The boundaries between infested and unprotectable are not demarcated, as these boundaries are not management boundaries.

## **Protectable areas**

Three sections of track are deemed protectable:

- The uninterpretable section at the eastern end of the track, adjacent Windy Harbour Road;
- The uninfested section which straddles the Gardner River watershed; and
- The uninfested section at the western end of the track, adjoining the private property.

(Refer to Moore mapping Protectable Areas Map (Moore 2011) Figure 15)

The track construction limestone material must have certified “Disease Free” Limestone utilised (refer to Correspondence from Walco Limestone Supplies Appendix 1).

The P.c. Protectable Areas Map produced for the area has proposed age limits. Mapping and site verification will be undertaken by Moore Mapping (Dieback Specialists) prior to commencement of works. An updated Protectable Areas Map will be produced and a review of the Hygiene measures in view of any new information/data.

## **Plant Disease Management**

Movement of soil across the demarcation lines is shown graphically below. For example, when moving from infested areas to uninfested areas vehicles and machines must be “Clean on Entry”.

The following will apply to all aspects of operations and form part of the hygiene management briefing to all site workers:

- Earth moving vehicles and equipment are to be cleaned prior to entering site;
- Visual inspections on vehicles, plant, equipment and footwear are clean when entering “Protectable Areas”;
- Footwear to be cleaned via brushing and spraying methanol on shoes prior to site entry.
- Access to the site during construction will be controlled (fenced and gated and locked when unattended);
- Completed areas will be rehabilitated as soon as practicable;
- The rehabilitated surface will be free draining and not contain wet or waterlogged soils;
- Materials used in rehabilitation will be P.c. free from on-site material, topsoil to be managed to ensure there is no spread of unprotectable material onto protectable areas.
- Road and transport vehicles are to be restricted to defined track, loading and turn around areas.

Entry into “Protectable Areas” will be identified by:

- Signage;
- An inspection and/clean down points and cleaning equipment; and
- A safe place for large vehicles and equipment to turnaround and exit the area if on inspection are not clean or cannot be effectively cleaned in the field.

## **Cleandown specification:**

A visual inspection is necessary to determine whether or not boots, vehicles, machinery or equipment is free of a build up of:



- Clods of soil and plant material and/or
- Slurry consisting of a mixture of soil, plant and water;
- Dust and grime adhering to the sides of vehicles need not be removed before entering uninfested areas;
- Records of inspections and clean-downs are to be maintained.

(CALM 2003)

### **Completion of the Project**

At completion of the project any rehabilitation works must comply with the conditions of the *P.c.* Management Plan by:

- Uninfested areas can only be rehabilitated by clean soil and vegetation utilised in the uninfested areas, this can be achieved by stockpiling uninfested material inside the demarcation boundaries until completion of the project; and
- All equipment to be cleaned and decontaminated before leaving areas of infested soils.

### **Material Supply**

The works will require the importation of two materials onto the site. The drainage infrastructure, pipework and headwalls, will be transported onto the site and will be subjected to the cleaning procedures as previously outlined. The limestone track base material will be supplied by a nearby Windy Harbour quarry (Walco). The material will be independently certified as being "Free of *P.c.*" in addition to being tested as suitable for the track construction purpose.

The reduced travel distance for the supply of limestone road base will reduce the potential for contamination during transport. Each of the limestone road base delivery vehicles will be subjected to the cleaning procedures as previously detailed as delivery from the quarry is by sealed road only.

*P.c.* measures will include requirements for:

- Clearing to be undertaken with no interaction between hygiene categories and in dry soil conditions;
- Where possible, topsoil from areas free of *P.c.* will be removed prior to those areas determined to contain the *P.c.* pathogen;
- Material removed will be segregated and all *P.c.* infected material quarantined in a designated location. Stockpiles will be appropriately signed, contained and bunded;
- Raw materials used for track construction (limestone) is to be certified as *P.c.* free and road drainage is not allowed to be directed to these areas from areas of *P.c.* infection;
- Raw materials for construction of walkways which traverse protectable areas are to be certified *P.c.* free and of limestone base;
- *P.c.* hygiene measures will be implemented to ensure all vehicles and equipment are cleaned/washed down prior to mobilising to site, and when moving from *P.c.* infected to *P.c.* free areas within the site; and
- No fill material brought to site for the track construction.

Measures to control the spread of weeds will be implemented. These will include:

- Limiting initial disturbance areas;
- Ensure all vehicles and equipment are cleaned/washed down prior to mobilising to site;
- Restricting vehicles to established trafficable areas;
- Undertaking appropriate control spraying using non-residual herbicides;
- Topsoil will be stockpiled and used for rehabilitation (with regard given to *P.c.* hygiene measures); and
- Areas identified for rehabilitation will be revegetated using locally occurring species and will be managed to prevent the spread of weeds and dieback.

### **8.2.3.2. Weed Management**

Weed management is to be used in conjunction with dieback disease management. The following Weed Management Plan is to apply to all aspects of site operations. Natural Area Consulting (NAC 2011a) recorded minimal weed species along the Doggerup Road Reserve, with minor infestations within the first 1.5 km from Windy Harbour Road.

All operations shall conform to the weed management plan, and monitoring to occur post construction for any infestations. Weed management will primarily be undertaken through avoiding introducing new weeds to the Subject Site.

The aims of Weed Management along Doggerup Road will be:

- Maintain a weed free environment along Doggerup Road
- Ensure all vehicles are clean on entry prior to any soil or vegetation movement;
- Comply with Dieback/Disease Management Plan in Section 7;
- Site is to be secured to prevent trespassers illegally accessing, dumping rubbish and green waste;
- All weeds on site removed promptly on discovery;
- Remove weeds from least affected areas to the most affected areas (Bradley Method); and
- Do not use weed affected soils for rehabilitation, but remove infected soils to waste disposal; and
- Regularly monitor the site for invasive species.

If weeds are discovered on site they will be treated using the following methodology:

- Large woody weeds will be burned, poisoned or removed from site and disposed to approved green waste;
- Small weeds will be sprayed by a licensed contractor or the Proponent; and
- Initial follow up spraying will be undertaken at 6 months and 18 months and repeated as necessary.

The EMP outlines species specific weed eradication methodologies as recommended by the Department of Agriculture and Food WA. The program for weed management will be implemented prior to construction, construction activities, and post construction monitoring activities. During construction there will be provisions in the contractor's agreement of works aligned to the Weed Management Plan. The weed management program is a guide for aggressive common species (adapted from Department of Agriculture and Food recommended techniques) and should be used as a guide to treat infestations promptly.

Briefing information to site personnel during construction will include but not be limited to:

- Maintain a weed free working environment through clean vehicles on entry to Doggerup Road Reserve;
- Ensure weeds are not moved into weed-free areas through demarcation points and inspections;
- Show personnel physical samples of weeds present on site;
- Regular inspections of undercarriage of machines;
- Techniques of topsoil management to be modified if weeds are present via removing infected topsoils or spraying prior to soil disturbance; and
- Hand/mechanical removal of weeds to green waste.

Initial weed management will be undertaken by the Proponent and as part of the ongoing management of the track construction site. The annual spraying and weed management shall continue be ongoing and undertaken by the Proponent if required. Advice will be given to the

Proponent from the Environmental Officer through regular inspections 6 monthly for a period of 3 years post construction.

#### **8.2.4. Predicted outcome**

The proposal will require clearing of approximately <6.5ha of vegetation for the track construction, with a minimal footprint proposed for the all-weather track significantly less vegetation removal is anticipated. Wetland areas will not be removed of vegetation.

The clearing is not likely to be significantly at variance with Clearing Principles (a), (b), (c), (e) (f) and (g) and is unlikely to be at variance with the remaining four principles.

The aim of the Dieback Management Plan (EMP Appendix 3) is to ensure there is zero spread of Phytophthora disease into uninfested areas of D'Entrecasteaux National Park. The hygiene plan and EMP documents the management measures for successful completion of the project in terms of education to personnel, decontaminating equipment, and defining access measures.

The Aim of the Weed Management Plan is to ensure there is zero import of new weed species and eradication of existing weed species. The weed management is aligned to Department of Agriculture and Food WA best practise and recommended eradication techniques. The Proponent gives a commitment of long term management of the site through the commission of the PER report and EMP recommendations.

The EMP (Appendix 3) has been prepared to document management measures for the project, which will be implemented to minimise impacts on flora and vegetation from the project. The EMP contains specific management action plans for Threatened Flora, Dieback and Weed Management which when deployed will ensure that minimal native vegetation is disturbed from the project, weeds, pathogens and *P.c* is not spread and there are minimal off-site impacts from the track construction.

### **8.3. Fauna**

#### ***EPA objective***

*The EPA's objective for native fauna is to maintain the abundance, diversity, geographic distribution and productivity of native fauna at the species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.*

#### **8.3.1. Applicable Policies, Guidelines and Standards**

The EPA has published a number of policies and guidelines relating to the identification and management of potential impacts on fauna. These include:

- Guidance Statement No 33: Environmental Guidance for Planning and Development,
- Guidance Statement No 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in WA;
- Position Statement No 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection; and
- EPA and DEC Technical Guide Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment.

#### **8.3.2. Potential Impacts**

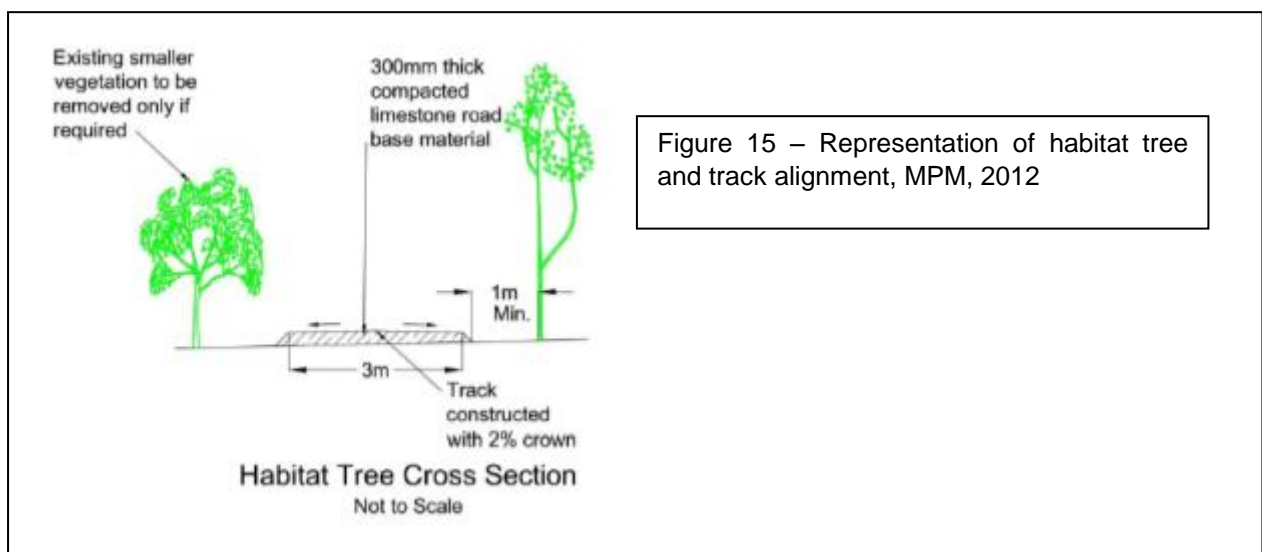
Clearing of vegetation at the site may result in a reduction in available fauna habitat. The total clearing area of the proposed development is 6.5 ha, of which 1.95 ha has been previously disturbed. Fauna corridors throughout the site link to surrounding areas of native vegetation on a local and regional scale. This means that the site maintains existing connections to breeding and other foraging areas, facilitates genetic transfer for fauna on site and in general allows for the movement of fauna regionally. Significant fauna, including white-tailed black cockatoos and Quendas, are known to use the site, however, no species are thought to use the site exclusively.



Disturbance is most likely to occur on a local scale, impacting individual animals, rather than a species. It is not considered that the proposal will significantly alter the fauna habitat of the region, or impact on the conservation status of any species.

Impacts to fauna are not expected to be long-term, with some localised disturbance to fringe habitats from the previously disturbed track. All habitat trees over 250mm in diameter (Jarrah, Marri, Agonis and Banksia) and 500mm in diameter for Karri will be taped and avoided.

The proposed track alignment would be varied to ensure the maximum separation between the track pavement and any habitat tree is achieved. The separation distance would vary at each potential habitat tree due and weighed up against potential clearing on the opposite side of the track, however indicative measurements on site indicate that an absolute minimum separation of pavement edge to a habitat tree would be 1.0m. Please refer to Figure 15 showing an engineering sketch indicating how the track would be located adjacent to a potential habitat tree.



The methodology of preserving trees at >250mm diameter (outlined above) for habitat trees is greater than the “Current Best Practise” required by the Department of Sustainability, Environment, Water, Population and Communities *Guidelines “Environment Protection and Biodiversity Conservation Act 1999 draft referral guidelines for three threatened black cockatoo species: Carnaby’s cockatoo (endangered) Calyptorhynchus latirostris Baudin’s cockatoo (vulnerable) Calyptorhynchus baudinii Forest red-tailed black cockatoo (vulnerable) Calyptorhynchus banksii naso (DSEWPC 2011).* The all-weather access track will avoid trees which may provide present and future habitat trees in the Road Reserve for these species.

The wetlands and creek system may form suitable habitat for fish species such as the vulnerable Balston’s Pygmy Perch (*Nannatherina balstoni*) (EPBC Act 1999 (Cwlth) and WCWA)) and the Priority 3 species *Galaxiella nigrostriata* (Black striped minnow) (WCWA 1950), as water conditions and geology are similar to those in other locations within the broader Gardner Watershed System where there are known populations of the fish. The wetland system is not deemed to be inhabited by *G.munda* (Western mud minnow).

The species if present would most likely inhabit water crossings 3 and 4 (Figure 4), the construction methodology requires that pipes are installed with zero grades to ensure water flows in both directions and there is no obstruction to water fauna (MPM 2010). Construction impacts will be low with “No Soil Disturbance” policy and “laying pipes” on existing wetland/no vegetation clearing methodology.

Potential impacts to fauna associated with the proposal include:

- Clearing of native vegetation resulting in loss of habitat and foraging areas;
- Direct loss and/or disturbance of fauna during clearing and construction;
- Increased risk of fire;
- Degradation of habitat due to the invasion or spread of weed species or *P.c.*; and
- Fragmentation/loss of habitat of Threatened Fauna and EPBC listed terrestrial fauna, triggering significant impact under the EPBC Act Specially Protected Fauna.

### **8.3.3. Environmental Mitigation and Management**

The following management measures have been developed and incorporated into the Engineering Specification and EMP to reduce the likelihood of impacts to native fauna. These measures have been developed with the aim to retaining, building and maintaining the habitat values of the site:

- Prior to commencement of track works, all 66 potential and future habitat trees (>500mm in Karri and >250mm diameter in all other trees) located within the 20m road reserve be flagged to be retained. These will be clearly marked and coded with information relayed to all site personnel.
- The linear nature of the project and minimal disturbance to possible present and future habitat trees and habitat will ensure that fauna corridors are retained to link the site to surrounding areas of native vegetation. These corridors will provide habitat linkage on a local and regional scale. The site will therefore maintain existing connections to surrounding habitat, facilitate genetic transfer for fauna on site and in general allows for the movement of fauna regionally;
- Minimal extent of clearing vegetation, and keeping to disturbed areas;
- ‘Floating’ the track over wetland areas with stabilisation to culverts with concrete sandbagging;
- Use of multiple culverts to ensure water flows are not restricted by track development and potential passage for water fauna;
- Turnaround areas and passing lanes to be restricted to cleared areas and not in waterways; and
- Installation of >250mm diameter (generally 300mm) concrete re-enforced pipes to ensure hydrological flows are maintained in wetland areas for fish species.

An EMP has been developed for the project. The following management controls are incorporated into the EMP and will be implemented to minimise impacts on native fauna:

- Clearing will be undertaken primarily in already cleared areas to allow fauna to move away from the area of disturbance;
- Bushfire planning has been incorporated in the EMP for the site;
- The EMP will be implemented in the relevant phases to address potential impacts to habitat including vegetation trampling and weed and dieback spread;
- Native fauna encountered during clearing will be allowed to make their own way from the site. If this is not possible operations will cease until the Environmental Officer has assessed the impact on the fauna species; and
- Any injured fauna encountered by the Contractor is given to local animal carers or a local vet.

A detailed Draft Construction Map is provided in Figure 17 (a-c). The locations of passing lanes, turnaround areas and hygiene clean down areas in this Draft Mapping are subject to further consultation and site verification. For further detail on environmental management for the project, refer to the EMP in Appendix 3.

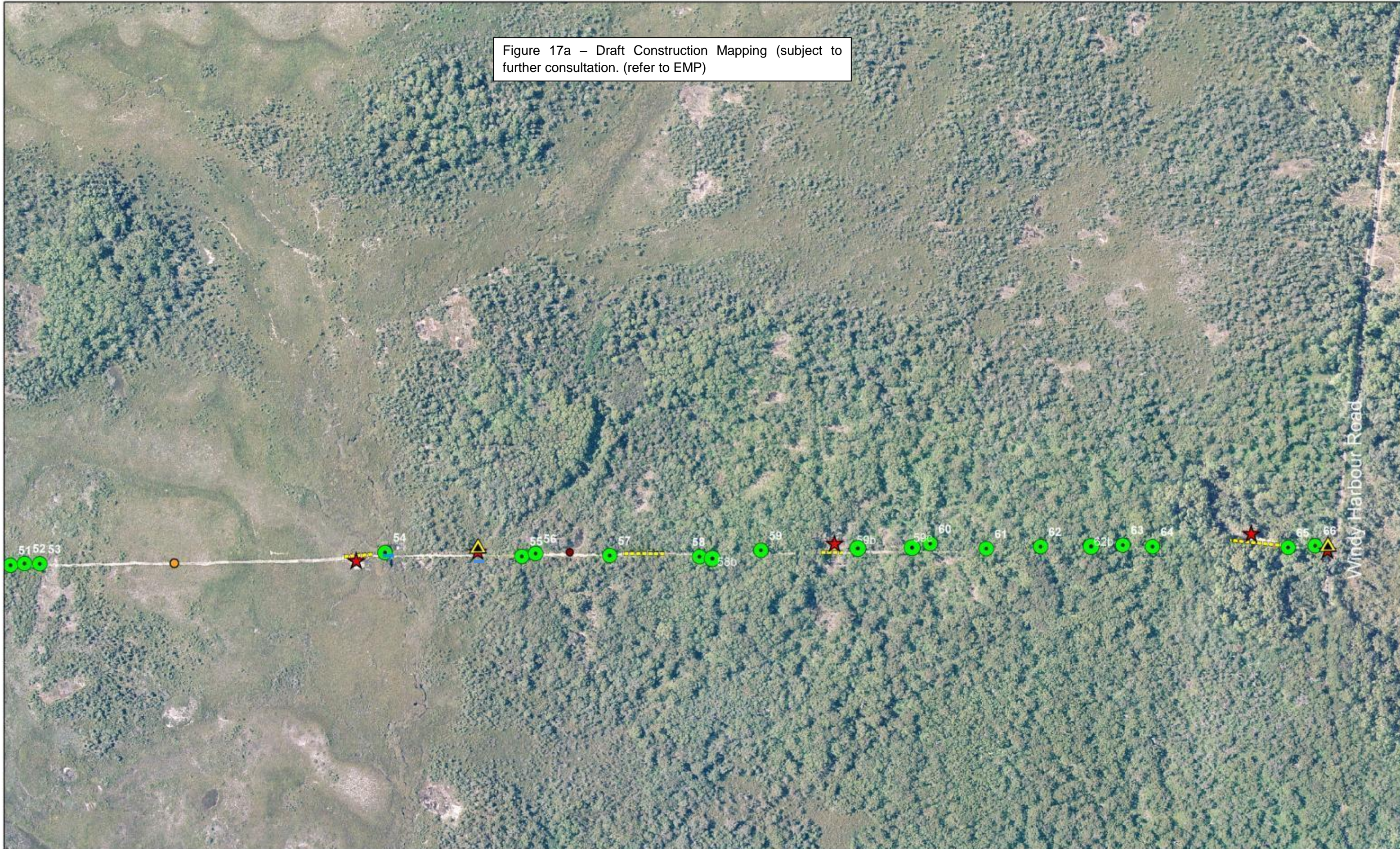
#### **8.3.4. Potential Outcome**

The proposal will result in the loss of approximately <6.5 ha of vegetation, with 1.95ha previously disturbed areas. Potential future habitat trees (feed and nesting) will be flagged and avoided to ensure future area habitat for black cockatoos and other fauna.

Regional fauna habitat and linkages are not likely to be significantly disturbed or disrupted by the proposal. It is not considered that the proposal will significantly alter the fauna habitat of the region. The proposal may result in a minor disturbance at a local scale, which is likely to impact on individual animals, rather than a population. No current breeding habitat is present on site for white-tailed black cockatoos, all potential habitat trees or suitable habitat areas will be retained, hence no breeding sites will be impacted by the proposal.




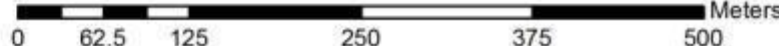
Figure 17a – Draft Construction Mapping (subject to further consultation. (refer to EMP))



**Legend**

- Flora - A.barbata
- Flora - H.australis
- ★ Turnaround Areas
- Flora - A.sp Scott River
- Flora - S.leeuwinese
- ▬ Passing lanes
- Flora - G.filiformis
- ▬ Water Crossing
- Habitat Tree
- ▲ Hygiene Cleardown
- Flora - G.pusilis (outside reserve)

Scale 1:5500 @ A3

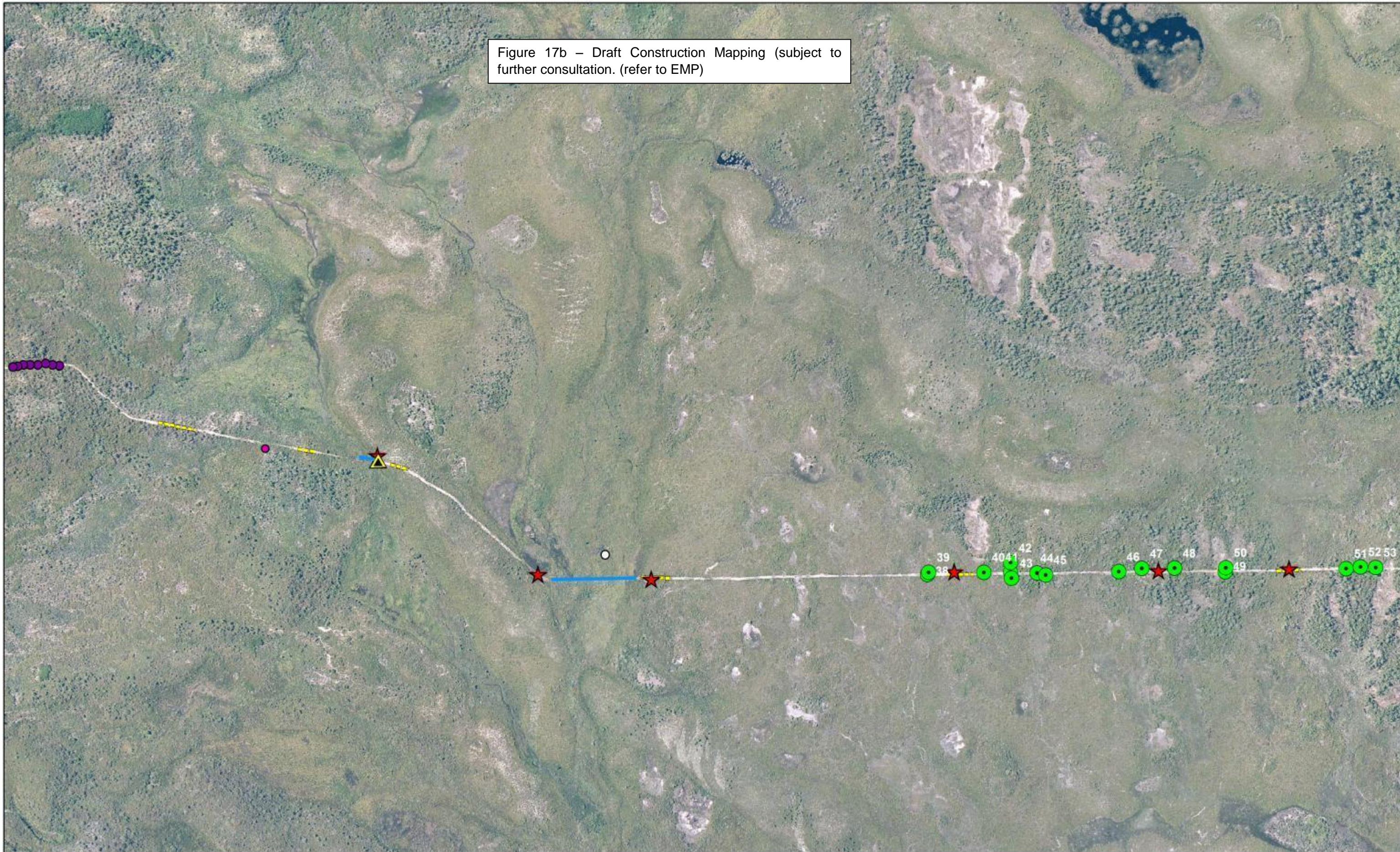


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<b>CLIENT</b> Shellbay Holdings Doggerup Road Windy Harbour		
<b>Construction Plan Page 1</b>		
STATUS	FILE	DATE
DRAFT	LAND001	06/03/2012



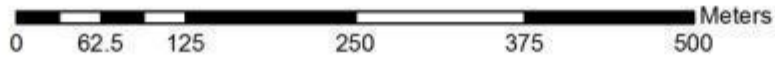
Figure 17b – Draft Construction Mapping (subject to further consultation. (refer to EMP)



**Legend**

- Flora - A.barbata
- Flora - H.australis
- Flora - A.sp Scott River
- Flora - S.leeuwinese
- Flora - G.filiformis
- Flora - G.pusilis (outside reserve)
- ▲ Hygiene Cleandown
- ★ Turnaround Areas
- ▬ Passing lanes
- ▬ Water Crossing
- Habitat Tree

Scale  
1:5500 @ A3



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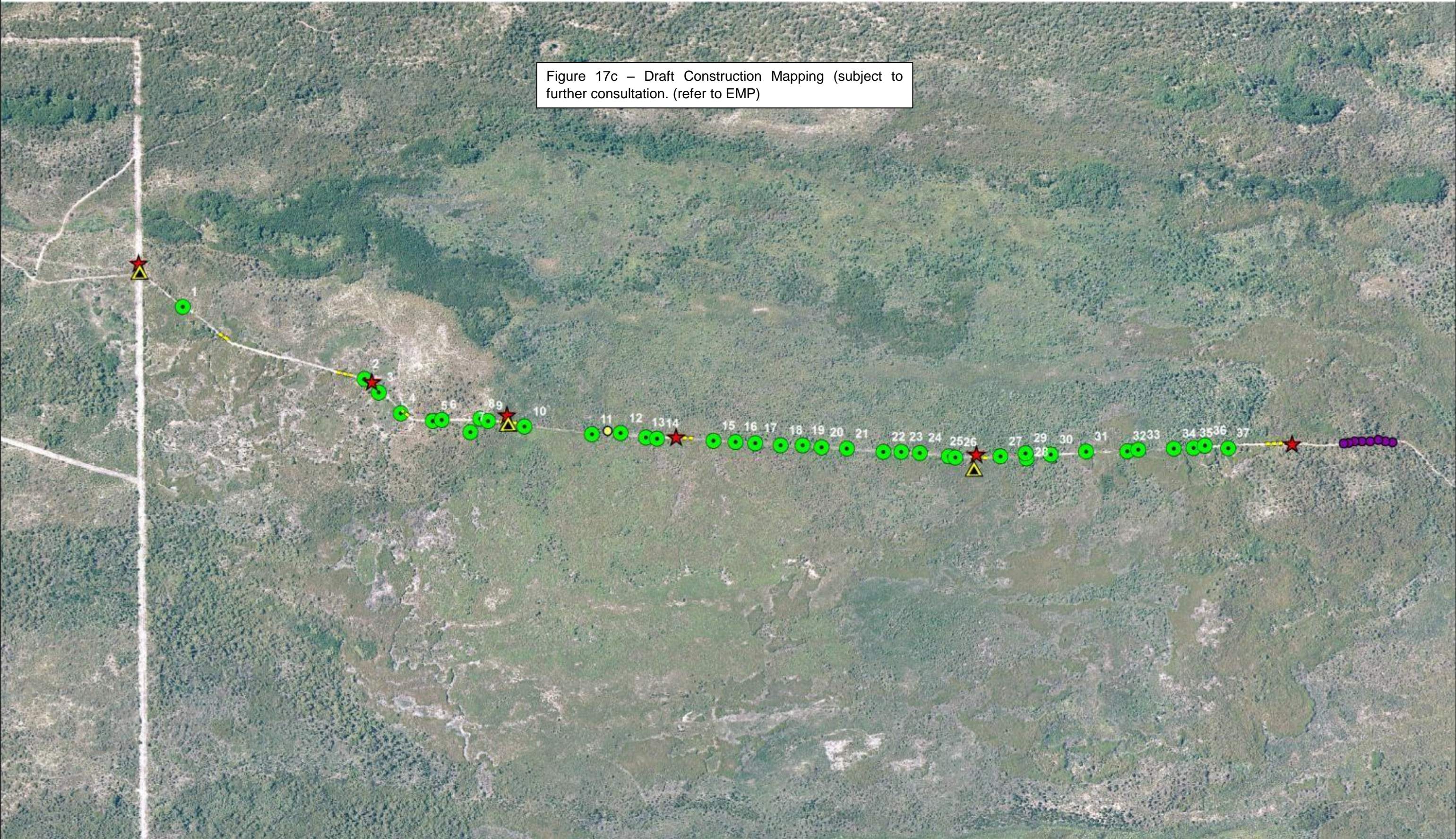
CLIENT Shellbay Holdings  
Doggerup Road  
Windy Harbour

**Construction Plan Page 2**

STATUS	FILE	DATE
DRAFT	LAND001	06/03/2012



Figure 17c – Draft Construction Mapping (subject to further consultation. (refer to EMP))



**Legend**

- Flora - A.barbata
- Flora - A.sp Scott River
- Flora - G.filiformis
- Flora - G.pusilis (outside reserve)
- Flora - H.australis
- Flora - S.leeuwinese
- Water Crossing
- ▲ Hygiene Clean-down
- ★ Turnaround Areas
- ▬ Passing lanes
- Habitat Tree

Scale  
1:5500 @ A3





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<b>CLIENT</b> Shellbay Holdings Doggerup Road Windy Harbour		
<b>Construction Plan Page 3</b>		
<b>STATUS</b> DRAFT	<b>FILE</b> LAND001	<b>DATE</b> 06/03/2012



## 8.4. Heritage

### ***EPA's Objective***

*To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation (EPA 2004).*

The *Aboriginal Heritage Act 1972* defines Aboriginal sites and provides for the preservation of places and objects customarily used by or traditionally important to Aborigines, and prohibits the concealment, destruction or alteration of any Aboriginal sites. The two previous aboriginal heritage surveys in the area and a search of the Department of Indigenous Affairs (DIA) Aboriginal Sites Register indicates that there are at least 4 sites recorded in the near vicinity of the project but none within the area proposed to be developed.

Potential impacts include:

- Disturbance to aboriginal heritage sites within the subject area.
- The threat of *P.c.* & disturbance to such a pristine swampland area.
- The Impact of using bore water, sewerage concerns and the impact of roads leading to places of significance & fragile coastal dunes.
- With the Subject Site's proximity to Chudalup, the many other mythological & archaeological sites nearby and with the dune systems possibly containing skeletal remains, the people are opposed to any further development in and around the Windy Harbour area.

As per DIA recommendations to the Proponent, a suitably qualified consultant was engaged by the Proponent to identify Aboriginal Heritage sites at the Doggerup Road Reserve. No heritage sites were identified and consultation will be ongoing with South West Boodjara Working Party which speak for the Windy Harbour area throughout the project lifespan. The consultation phases have been initiated and the concerns of the Working party are being addressed in the EMP document.

### **8.4.1. Environmental Mitigation and Management**

Ongoing consultation is occurring with South West Boodjara Working Party which speak for the Windy Harbour area throughout the project lifespan. This will ensure any heritage issues are considered combined into the EMP and implementation phases of the EMP. It is possible as an outcome of this consultation that an Aboriginal Heritage consultant/monitor will be on site during earthworks phases.

### **8.4.2. Potential Outcome**

No heritage sites as listed by the *Aboriginal Heritage Act 1972* will be disturbed.

## **8.5. Soil Management: Erosion, Degradation and Acid Sulfate Soils**

### ***EPA Objective***

*EPA's objective for land is to maintain its integrity, ecological functions and environmental values (EPA 2004e).*

### ***EPA Objectives ASS***

- *To maintain the integrity, ecological function and environmental values of the soil and landform.*
- *To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.*
- *To ensure that rehabilitation achieves an acceptable standard compatible with the intended land use, and consistent with appropriate criteria.*

### **8.5.1. Applicable Policies, Guidelines and Standards**

The DEC has published a number of guidelines relating to the identification, reporting and management of contaminated sites and ASS in WA, including the *Contaminated Site Management Series report; Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes* (DEC, 2009).

### **8.5.2. Potential Impacts**

The Subject Site has a variety of soil types which could be susceptible to erosion and degradation from soil disturbance. The objective will be to maintain ecological functions and environmental values of landforms and soils within the subject area.

Potential impacts include:

- Construction earthworks exposing soils resulting in erosion and degradation and loss of ecological function;
- Acid Sulphate Soil being exposed through excavation of soils in wetland areas;
- Loss of vegetation from exposure to Acid Sulphate Soils; and
- Pollution of waterways through exposure of Acid Sulphate Soils.

### **8.5.3. Environmental Mitigation and Management**

#### **Acid Sulfate Soils**

There are no Acid Sulfate Soils (ASS) present on site, Potential ASS risk areas will be avoided ensuring that ASS are not disturbed. All operations in wetland areas will be undertaken at the driest time of the year with a “No Soil Movement Policy” to apply. The track will be constructed by fill and culverts to “Float” road over wetland areas.

#### **Rehabilitation**

Rehabilitation will be to constructed soils and a return to remnant vegetation. The rehabilitation areas will be clearly defined during track construction by the Project Manager with input from the Environmental Officer. The following objectives will apply to all rehabilitation works:

- To re-instate vegetation to continue the future biodiversity of the area.
- Assist naturally revegetating areas to return to pre-disturbed state;
- To establish vegetation through revegetation and regeneration of denuded areas with local endemic species through use of preserved topsoil;
- Brushing with adjacent vegetation types within the vegetation communities;
- To reduce weed invasions and competition of weeds with native species; and
- To assist with on the ground implementation of the revegetation.

Wetlands areas will not undergo any soil disturbance with the track being constructed over the top of the existing vegetation and previously disturbed areas. The track would be constructed on top of the existing cleared surface with minimal clearing vegetation required within the Subject Site prior to laying and compaction of limestone. It is proposed to construct a limestone roadbase material track 3.0m wide that would be identical to that of existing tracks and roads within the area. Refer to Section 3 of this document for Construction Methodology.

#### **Rehabilitation methods**

- The method of revegetation is to use the seed from existing topsoil, brushing with adjacent vegetation and mulched remnant vegetation on site (from cleared areas).
- If seeding required, seed will be collected at appropriate seasons from adjacent vegetation and dispersed over constructed soils if required for further revegetation.
- Any weeds likely to significantly impact on the rehabilitation will be sprayed with Roundup or similar herbicide, or grubbed out, depending on the species involved as per the Weed Management Plan.
- Rehabilitation will be carried out promptly after soil disturbance.



### **Seed stock**

Species shall be sourced from stockpiled topsoil, cleared/mulched native vegetation from clearing operations and seed/brush collection onsite (if required). Brush shall be collected and laid over any exposed areas to ensure that wind and water erosion does not occur. This is particularly successful in coastal sandy areas. If regeneration is slow then seed shall be collected at the first spring period and spread at the first Autumn rains (usually after three continuous rain days is recommended). It is anticipated that most species will regenerate from site topsoil (understorey and midstorey species).

### **Methodology**

The revegetation methodology is proposed to be undertaken using the following steps:

1. Remove topsoil and place on regeneration area or store adjacent to the site (no more than 10m from removal area).
2. Store topsoil in piles no higher than 0.5m.
3. Spread topsoil over batters and regeneration areas of the track.
4. Ensure batters do not exceed 1:5m slopes.
5. Collect brush from adjacent tree and understorey species (no longer than 1.5m and 2cm diameter) lay randomly over the revegetation area in a mixed fashion to stabilise the site and provide seed establishment.
6. Inspect site after first large rainfall event, re-lay any brush where required.
7. Inspect site after 6 months to determine success rate of revegetation and any weed establishment. Remove weeds either through selective spraying or hand removal.
8. Inspect site after 6, 12 and 18 months to determine success rate of native plant establishment and any weed establishment. Remove weeds either through selective spraying or hand removal.
9. Instigate any local species seed collection of required to “bulk out” revegetation areas.

### **Topsoil Management**

Where topsoil removal is required, topsoil and overburden will be directly transferred from an area being cleared to an area to be rehabilitated. Where this is not possible the topsoil and overburden will be stored in low dumps (overburden and 0.5m for topsoil) for future use in rehabilitation.

In accordance with the MPM Development Consultants Engineering Report (MPM 2010), topsoil will only be removed from the base of the track pavement prior to the installation of limestone track base material. The proposal is to place the limestone track base material directly onto the natural surface. The existing base will not be excavated, proof rolled or have the small organic material removed, thereby preventing any damage to nearby vegetation and root systems. This will negate the need for large scale material removal of topsoil material by larger machinery. This is not a preferred method of constructing a track, as it is highly likely that subsidence of the track will occur due to an uncompacted base and the decay of the organic material beneath the track over time. This method provides the least impact on the surrounding environment, with track likely requiring minor “topping up” with limestone track base material after 12 months.

No soil movement is to occur during rainfall or wet soil conditions. Operations are to cease and reviewed by the Environmental Officer and the Project Manager until dry soil conditions prevail.

### **Bank stability works/erosion control**

The predominant soil type is deep sands and loams/sands over granite/laterite. Loose sands during revegetation works can be subject to prevailing winds and water erosion. Mounding of the revegetation areas will assist with the runoff from the revegetated areas and brushing will reduce the effects of wind erosion. The mounding and contouring of soil will also assist in trapping water for seedling germination and growth. Mounding should occur along contours or in flat areas perpendicular to surface flow direction.

Riparian vegetation will be retained around creeks occurring within the track construction area to prevent erosion and sedimentation and maintain hydrological function/flows. Specific areas noted for stabilisation are adjacent to the central creek and in the rehabilitation/remediation areas. These areas are sensitive and water flows are to be maintained with minimal sedimentation to adjacent waters required.

Stabilisation techniques may need to be applied during and post construction activities (i.e. use of sediment traps). Mulching of pit faces or use of geo-fabrics should be used wherever possible to ensure there is minimal erosion to the site. The creek area should not receive untreated storm water from surface water run-off, all water will need to be treated prior to entering into the creek/wetland areas.

It is recommended as the site is predominantly sandy (topsoil) in nature, best practise is carried out when site is developed and sediment traps are installed during construction activities with any bare ground areas stabilised (i.e. mulching with removed vegetation).

#### **8.5.4. Potential Outcome**

The potential outcomes are envisaged to be:

- Minimal disturbance to soils through construction methodology resulting in little erosion and degradation to subject area;
- Revegetation and top soils management as per best practise methodologies; and
- No disturbance to ASS or Potential ASS.



9. Summary of Potential Environmental Impacts, their Significance and Management Responses.

Table 18 – Summary of Potential Environmental Impacts, their Impact Significance and Possible Management Responses.

Environmental Factor	EPA Objectives	Existing Environment	Potential Impacts	Proposed Management	Predicted Outcome
Wetlands	<ul style="list-style-type: none"> <li>To protect the environmental values and functions of wetlands in Western Australia;</li> <li>To protect, sustain and, where possible, restore the biological diversity of wetland habitats in Western Australia;</li> <li>To protect the environmental quality of the wetland ecosystems of Western Australia through sound management in accordance with the concept of 'wise use', as described in the Ramsar Convention, and ecologically sustainable development principles, regardless of land use or activity;</li> <li>To have as an aspirational goal, no net loss of wetland values and functions;</li> <li>To maintain the quantity of water (surface and ground) so that existing and potential environmental values, including ecosystem maintenance, are protected;</li> <li>To ensure that the quality of water emissions (surface, ground, and marine) does not adversely affect environmental values or the health, welfare and amenity of people and land uses, and meets statutory requirements and acceptable standards.</li> </ul>	<p>NAC Wetland Specialists (2011) undertook Wetlands Assessment defining the wetlands as part of the Gardner Watershed catchment area.</p> <p>The potential impact area is small, some 1.4 ha or 0.055% of the area known as the Doggerup Creek System of wetlands, or 10.8% of the gazetted road reserve area.</p> <p>The Project site has a moderate risk of suitable habitat for the vulnerable Balston's Pygmy Perch (<i>Nannatherina balstoni</i>) (EPBC Act and WCWA) and the Priority 3 species <i>Galaxiella nigrostriata</i> (Black-striped Minnow) (WCWA), as water conditions and geology are similar to those in other locations within the broader Doggerup Creek System where there are known populations of the fish.</p> <p>There is minimal groundwater resources in the local area.</p>	<ul style="list-style-type: none"> <li>Fragment the Gardner watershed wetland system and cause compaction and alteration of the sub-surface hydrology.</li> <li>Protection of ecological and hydrological role of wetlands within Doggerup Road and adjacent ESA.</li> <li>Disturbance to shallow basins with intermittent wetlands community structure and composition, alteration to basin structure.</li> <li>Potential disturbance to hydrological function and impact.</li> <li>There is a high likelihood of some impacts to vegetation within the areas covered by the wetlands, however it is also believed that through appropriate engineering or other design methods, these can be kept to a minimum.</li> </ul>	<p><b>Engineering design</b></p> <ul style="list-style-type: none"> <li>Installation of site specific pipe culverts;</li> <li>Detail on construction methodology and generic cross sections detail of culvert construction;</li> <li>Use of multiple culverts to ensure water flows are not restricted by track development;</li> <li>No excavation of soils in wetland areas;</li> <li>No vegetation clearing in wetland areas;</li> <li>Grading of the track to a crowned surface or at cross fall to suit natural slope, small off shoot drains if required; and</li> <li>Passing lanes/turn around areas confined to existing cleared areas or where minimal vegetation removal is required, no passing lanes at wetland areas.</li> </ul> <p><b>EMP</b></p> <ul style="list-style-type: none"> <li>Limiting initial disturbance areas,</li> <li>Undertake all work in dry soil conditions and in driest time of the year;</li> <li>Briefing of all machine operators of the Engineering specification and minimal disturbance to wetland areas;</li> <li>Ensure all vehicles and equipment are cleaned/washed down prior to mobilising to site,</li> <li>Restricting vehicles to established trafficable areas;</li> <li>No soil movement in wetland areas, thereby not disturbing any potential ASS; and</li> <li>Implement hygiene and weed management controls with briefing to all site workers upon entry to Road Reserve.</li> </ul>	<ul style="list-style-type: none"> <li>Minimal long term disturbance to wetland areas and hydrological flows.</li> <li>Localised disturbance may occur to wetlands in short term, with return to function in the long term.</li> <li>No disturbance to adjacent ESA wetland area, confined to Road Reserve area</li> <li>No off site impacts are anticipated to the wider Gardner Watershed wetlands.</li> <li>The project is not anticipated to affect any groundwater resources.</li> </ul>
Native Vegetation and Declared Rare and Priority Flora, Threatened Ecological Communities	<p>The EPA's objective for flora is to maintain the abundance, diversity, geographic distribution and productivity of flora at the species and ecosystem levels through the avoidance or management of adverse impacts and through improvement in knowledge.</p>	<p>NAC Flora Specialist undertook Flora Survey in Spring and Summer to ascertain Vegetation Types and flora representation within the Road Reserve.</p> <p>A total of 236 species were recorded in the survey area and 7 Vegetation units were described being: Ed: Tall Closed Forest, EmCc: Tall Open Forest, OH: Open Heath, Em Low Woodland, CTS: Wetland areas, Tf: Low Open Forest, BIBq Low open Woodland.</p> <p>None of the vegetation complexes traversed by the survey area are considered to be under threat (Havel, 2002) at a local, regional or state level.</p> <p>No Declared Rare Flora was recorded in the Project area during the flora survey. 6 Priority flora species were recorded <i>Hemiandra Australia</i>, <i>Andersonia barbata</i>, <i>Astartea sp. Scott River</i>, <i>Goodenia filiformis</i>, <i>Gonocarpus pusilis</i>, <i>Stylidium leewinense</i> were recorded on the site.</p> <p>NAC noted that <i>Leucopogon rubricaulis</i> and <i>Schoenus submicrostachyus</i> are both on the western side of their currently known ranges and two species was considered locally endemic (<i>Xyris indivisa</i> and <i>Astartea sp. Scott River</i>).</p> <p>There are no TECs within, or in close proximity to the site.</p>	<ul style="list-style-type: none"> <li>Spread of <i>P.c</i> impacting wetland species, fragile plant communities and native vegetation within ESA.</li> <li>Clearing of Native Vegetation resulting in loss of biodiversity and habitat.</li> <li>Cumulative impacts of habitat loss on terrestrial flora;</li> <li>Impacts of fragmentation on consolidated areas of native vegetation;</li> <li>Indirect impacts on adjacent National Park; and</li> <li>Impact from disturbance to significant vegetation and flora, especially in relation to the abundance, diversity, geographic distribution and productivity</li> </ul>	<p><b>Engineering</b></p> <ul style="list-style-type: none"> <li>Minimal footprint of clearing vegetation, keeping to disturbed areas;</li> <li>'Floating' the track over wetland areas with stabilisation to culverts with concrete sandbagging;</li> <li>Turnaround areas and passing lanes to be restricted to cleared areas and not in waterways; and</li> <li>Installation of &gt;250mm diameter concrete re-enforced pipes to ensure hydrological flows are maintained in wetland areas for fish species.</li> </ul> <p><b>EMP</b></p> <ul style="list-style-type: none"> <li>Limiting disturbance areas and native vegetation clearing.</li> <li>Ensure all vehicles and equipment are cleaned/washed down prior to mobilising to site,</li> <li>Restricting vehicles to established trafficable areas</li> <li>Undertaking appropriate control spraying using non-residual herbicides;</li> <li>Topsoil will be stockpiled and used for rehabilitation (with regard given to Dieback hygiene measures);</li> <li>Areas identified for rehabilitation will be revegetated using locally occurring species and will be managed to prevent the spread of weeds and dieback; and</li> <li>Locating priority and locally endemic species prior to work commencing and avoiding where possible.</li> </ul>	<ul style="list-style-type: none"> <li>Clearing of approximately &lt;6.5ha.</li> <li>Minimal footprint proposed for the all-weather track</li> <li>Significantly less vegetation removal is anticipated.</li> <li>Wetland areas will not be removed of vegetation.</li> <li>The clearing is not likely to be significantly at variance with Clearing Principles (a), (b), (c), (e) (f) and (g) and is unlikely to be at variance with the remaining four principles.</li> </ul>

Table 18 cont.

Environmental Factor	EPA Objectives	Existing Environment	Potential Impacts	Proposed Management	Predicted Outcome
Dieback	<p>The EPA's objective for flora is to maintain the abundance, diversity, geographic distribution and productivity of flora at the species and ecosystem levels through the avoidance or management of adverse impacts and through improvement in knowledge.</p>	<p><i>P.c.</i> was found to span a large portion of the area (3.7km) and was found to be in most of the swampy low lying areas, with the disease expression variable ranging from obvious to subtle which was dependant on the age of infestation.(Moore 2011).            Three sections of track are deemed protectable by Moore Mapping (2011):</p> <ul style="list-style-type: none"> <li>The uninterpretable section at the eastern end of the track, adjacent Windy Harbour Road.</li> <li>The uninfested section which straddles the Gardner River watershed.</li> <li>The uninfested section at the western end of the track, adjoining the private property.</li> </ul> <p>Three short sections of track are deemed unprotectable by Moore Mapping (2011):</p> <ul style="list-style-type: none"> <li>Two sections between the major creek crossing and the Gardener River watershed.</li> <li>To the west adjacent sample 3.</li> </ul> <p>These areas are unprotectable due to the minimal size of the areas.</p>	<ul style="list-style-type: none"> <li>Spread of <i>Phytophthora cinnamomi</i> (Dieback) impacting wetland species, fragile plant communities and native vegetation within ESA.</li> <li>Loss of biodiversity and local loss of species from spread of <i>P.c</i> from road construction activities.</li> </ul>	<p>Dieback measures will include requirements for:</p> <ul style="list-style-type: none"> <li>Clearing to be undertaken with no interaction between hygiene categories and in dry soil conditions;</li> <li>Where possible, topsoil from areas free of Dieback will be removed prior to those areas determined to contain the Dieback pathogen;</li> <li>Material removed will be segregated and all Dieback infected material quarantined in a designated location.</li> <li>Raw materials used for track construction (limestone) is to be certified as Dieback free and road drainage is not allowed to be directed to these areas from areas of Dieback infection;</li> <li>Dieback hygiene measures will be implemented to ensure all vehicles and equipment are cleaned/washed down prior to mobilising to site, and when moving from Dieback infected to Dieback free areas within the site; and</li> <li>No fill material brought to site for the track construction.</li> </ul>	<ul style="list-style-type: none"> <li>Zero spread of dieback through track construction operations.</li> </ul>
Fauna	<p>The EPA's objective for native fauna is to maintain the abundance, diversity, geographic distribution and productivity of native fauna at the species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.</p>	<p>Significant fauna, including white-tailed black cockatoos and Quendas, are known to use the site, however, no species are thought to use the site exclusively.</p> <p>Disturbance is most likely to occur on a local scale, impacting individual animals, rather than a species or population. It is not considered that the proposal will significantly alter the fauna habitat of the region, or impact on the conservation status of any species.</p> <p>The wetlands and creek system may form suitable habitat for fish species such as the vulnerable Balston's Pygmy Perch (<i>Nannatherina balstoni</i>) (EPBC Act and WCWA) and the Priority 3 species Galaxiella nigrostriata (Black-striped Minnow) (WCWA), as water conditions and geology are similar to those in other locations within the broader Gardner Watershed System where there are known populations of the fish.</p> <p>Matter is a "Controlled Action" under the EPBC Act and is presently undergoing Preliminary Assessment.</p>	<ul style="list-style-type: none"> <li>Loss of habitat of native threatened fauna.</li> <li>Disturbance to fauna species during construction.</li> <li>Fragmentation/loss of habitat of Threatened fauna.</li> </ul>	<p><b>Engineering</b></p> <ul style="list-style-type: none"> <li>The linear nature of the project and minimal disturbance to ensure fauna corridors are retained to link the site to surrounding areas of native vegetation.</li> <li>Minimal extent of clearing vegetation, keeping to disturbed areas;</li> <li>'Floating" the track over wetland areas with stabilisation to culverts with concrete sandbagging;</li> <li>Use of multiple culverts to ensure water flows are not restricted by track development and potential passage for water fauna;</li> <li>Turnaround areas and passing lanes to be restricted to cleared areas and not in waterways; and</li> <li>Installation of &gt;250mm diameter concrete re-enforced pipes to ensure hydrological flows are maintained in wetland areas for fish species.</li> </ul> <p><b>EMP</b></p> <ul style="list-style-type: none"> <li>Prior to commencement of track works, all 66 potential and future habitat trees (&gt;500mm in Karri and &gt;250mm diameter in all other trees) located within the 20m road reserve be flagged to be retained;</li> <li>Clearing will be undertaken primarily in already cleared areas to allow fauna to move away from the area of disturbance;</li> <li>Bushfire planning has been incorporated in the EMP for the site;</li> <li>The EMP will be implemented in the relevant phases to address potential impacts to habitat including vegetation trampling and weed and dieback spread;</li> <li>Native fauna encountered during clearing will be allowed to make their own way from the site. If this is not possible operations will cease until the Environmental Officer has assessed the impact on the fauna species; and</li> <li>Any injured fauna encountered by the Contractor is given to local animal carers or a local vet.</li> </ul>	<ul style="list-style-type: none"> <li>Loss of approx &lt;6.5 ha of vegetation, with 1.95ha previously disturbed areas.</li> <li>All habitat trees (feed and nesting) will be flagged an avoided to ensure future area habitat for black cockatoos and other fauna.</li> <li>Regional fauna habitat and linkages are not likely to be significantly disturbed or disrupted by the proposal.</li> </ul>



Table 18 cont.

Environmental Factor	EPA Objectives	Existing Environment	Potential Impacts	Proposed Management	Predicted Outcome
Aboriginal Heritage	<p><i>To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.</i></p>	<p>Heritage sites exist to the south and east of the subject site. A DIA recommended heritage consultant undertook heritage assessment in 2011 and no probable heritage sites were located within the Doggerup Road Reserve.</p>	<ul style="list-style-type: none"> <li>Disturbance to aboriginal heritage sites within the subject area.</li> <li>The threat of dieback &amp; disturbance to such a pristine swampland area.</li> <li>The Impact of using bore water, sewerage concerns and the impact of roads leading to places of significance &amp; fragile coastal dunes.</li> <li>With the Subject Site's proximity to Chudalup, the many other mythological &amp; archaeological sites nearby and with the dune systems possibly containing skeletal remains, the people are opposed to any further development in and around the Windy Harbour area.</li> </ul>	<p>Ongoing consultation with South West Boodjara Working Party which speak for the Windy Harbour area throughout the project lifespan.</p> <p>The outcomes of the consultation process and the management actions required of the project from the Working Party will be addressed in the updated EMP prior to the project commencing.</p> <p>Possible Aboriginal Heritage consultants/monitors on site during site earthworks.</p>	<ul style="list-style-type: none"> <li>No disturbance to aboriginal heritage sites as per the <i>Heritage Act 1972</i>.</li> </ul>
Erosion and Degradation/ Acid Sulphate Soils	<p><i>EPA's objective for land is to maintain its integrity, ecological functions and environmental values (EPA 2004e).</i></p> <p><b>EPA Objectives ASS</b></p> <ul style="list-style-type: none"> <li><i>To maintain the integrity, ecological function and environmental values of the soil and landform.</i></li> <li><i>To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.</i></li> <li><i>To ensure that rehabilitation achieves an acceptable standard compatible with the intended land use, and consistent with appropriate criteria.</i></li> </ul>	<p>The site is located within the Albany-Fraser Orogen, with the main rock types being granite and gneiss intruded by dolerite dykes. The area is located within the Scott Coastal Plain which is based on deposits of sands of marine and alluvial origin and is characterised by extensive swampy plains (CALM 2005).</p> <p>Preliminary ASS Investigation (Kinnear 2011) was undertaken in accordance with DEC Identification and Treatment Acid Sulfate Soils (DEC 2009). Twelve test pits were excavated in and adjacent to the wetland areas within the Doggerup Road Reserve. The subject area sampling /digging test pits, was undertaken in remote wetland regrowth areas along the Doggerup Road Reserve adjacent to the D'Entrecasteaux National Park. These areas were targeted from the desktop assessment (70-100% Risk of ASS occurring SLIP dataset 2010) and are inaccessible by vehicle or machine as there is presently no access into the area, being surrounded by National Park.</p> <p>Of the 20 samples submitted to Bioscience WA for Laboratory testing none were found to be Actual ASS, 6 samples met PASS criteria, including sulphur levels in the exclusion analysis.</p>	<ul style="list-style-type: none"> <li>Construction earthworks disturbing soils creating erosion and degradation.</li> <li>Potential off-site impacts to adjacent national park.</li> <li>As the engineering proposal to build the track involves no soil disturbance in wetland areas, the subsequent risk assessment of the possibility of disturbing.</li> <li>Acid Sulfate Soils is deemed to be low.</li> </ul>	<p><b>Erosion and Soil Management</b></p> <ul style="list-style-type: none"> <li>Source of fill material for project is from Nelson Location 7965, limestone and disease free.</li> <li>Rehabilitation of road edges to ensure vegetation and soil stability is sustainable.</li> <li>Monitoring of revegetation and rehabilitation areas for minimum of 5 years.</li> <li>Development of pre, post and during construction Environmental Management Plan. The EMP gives commitments for long term management of the track, soils and erosion potential.</li> </ul> <p><b>ASS</b></p> <ul style="list-style-type: none"> <li>Avoidance of Acid Sulphate Soils.</li> <li>Undertake construction in dry summer period to avoid de-watering or wet soil conditions during construction.</li> <li>Minimal footprint of road design</li> <li>Sustainable engineering design.</li> </ul>	<ul style="list-style-type: none"> <li>Minimal disturbance to soils through construction methodology resulting in little erosion and degradation to subject area;</li> <li>Revegetation and top soils management as per best practise; and</li> <li>No disturbance to ASS or Potential ASS.</li> </ul>



## **10. Community and other stakeholder consultation programme**

To ensure that all aspects of the project encompass current best practise, legislative requirements and guidelines, the following Consultation Plan has been implemented through the responsibilities as set out in the Environmental Management Plan (Appendix 3).

Consultation shall occur with government agencies:

- During the compilation of the PER document, finalising the EMP document and prior to construction activities, project managers will consult with government agencies for feedback and comment regarding the proposed construction of the all weather access track;
- A site meeting with government agency representatives prior to lodgement of the Public Environmental Review documentation and
- During the preparation of Environmental Management Plan.

Recommended government agencies to consult are:

- Department of Water – regarding all storm water and water quality issues;
- Department of Environment and Conservation – vegetation and flora, fauna, wetlands weeds, disease, flora and fauna issues;
- Shire of Manjimup – regarding site construction activities, areas of environmental concern, road design and control measures implemented; and
- Department of Indigenous Affairs – Aboriginal Heritage

Personnel whom contact and consultation has already been initiated (and ongoing) regarding the proposal include:

- DEC Warren Region – Peter Keppel, Brad Barton, John Gillard.
- Shire of Manjimup – Gerard Treacy, Doug Elkins.
- EPA – Leanne Thompson, Shandell Raddock, Hans Jacob, Patrick Cavalli.
- DIA – Robert Reynolds.
- DEC Contaminated Sites Branch.
- DEC Species and Communities Branch - Peter Mawson.

Regular consultation shall occur with other stakeholders throughout the project, and has been initiated with:

- Neighbours;
- Aboriginal elders and heritage consultants;
- Community groups;
- Wildflower Society;
- Conservation Council; and
- Interest groups.

These groups have been briefed and consulted as part of the compilation of the PER. To date none of the above groups have provided any formal comment back regarding the project. Some groups have verbally (informally) advised that they would prefer to wait for the PER formal public consultation period to occur before giving any formal advise. Consultation is presently occurring with the South West Boodjara Working Party, where any current feedback and advise has been incorporated into the PER document.

## 11. Environmental Management

An Environmental Management Plan (EMP) has been prepared by the Proponent in consultation with the Shire of Manjimup and the DEC, a copy of which is provided in Appendix 3. The EMP documents the Proponents commitments in regards to:

- Pre, post and during construction tasks, including ongoing commitments to management of the track;
- Development of management review and feedback procedures;
- Development of corrective and preventative procedures;
- Development of performance monitoring and measurement procedures on the key features of the proposal which may have an impact on the environment;
- Development of communication procedures to DEC staff, members of the community and government officers, and communicating relevant procedures and requirements to contractors;
- Training, including induction, in environmental management procedures;
- Setting of appropriate objectives and targets, including responsibility for achieving these a time frame in which they are to be achieved;
- Specific Action Plans including: Weed management including revegetation and rehabilitation, monitoring, pre, post and during construction tasks, long term management and maintenance).
- Dieback Management, Revegetation and Rehabilitation, Construction Management, Drainage Management;
- Environmental review of the potential environmental impacts; and
- Review records to the EMP plan.

The Shire of Manjimup has indicated their support of the developing EMP document and has provided comment back regarding the draft document, refer to Appendix 3.

Regular management and maintenance will be carried out via the proponent for a post construction period of 12 months to ensure the road is maintained and not susceptible to erosion or scouring from stormwater. Regular monthly inspections and inspections after large rain events will occur as per the EMP recommendations to ensure all stormwater structures are in good working order and no scouring or erosion has occurred.

The long term management of the track will become the responsibility of the owners of Nelson Location 7965 (Shellbay Holdings Pty Ltd). In the event that the property is sold, a notification on title will be required to ensure the long term maintenance is known to be the responsibility of the property owner. The Proponent (Shellbay Holdings Pty Ltd) has given a commitment to long term maintenance through the endorsement and release of the EMP and the PER document.



## 12. List of Abbreviations and Acronyms

Acronym	Full Text
%	Percent
°C	Degrees Celsius
AHD	Australian Height Datum
AHIS	Aboriginal Heritage Inquiry System
ASS	Acid sulfate soils
BoM	Bureau of Meteorology
CALM	Department of Conservation and Land Management (now DEC)
Cwlth	Commonwealth
DAF	Department of Agriculture and Food (WA)
DEC	Department of Environment and Conservation (WA)
DIA	Department of Indigenous Affairs (WA)
DoW	Department of Water (WA)
DRF	Declared rare flora
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (Cwlth)
EMP	Environment management plan
EPA	Environmental Protection Authority (WA)
<i>EP Act</i>	<i>Environment Protection Act 1986 (WA)</i>
<i>EPBC Act</i>	<i>Environment Protection and Biodiversity Act 1999 (Cwth)</i>
ESA	Environmentally sensitive area
ESD	Environmental Scoping Document
FOI	Freedom of information
ha	hectare
km	kilometre
m	metre
mm	millimetre
MNES	Matters of national environmental significance
MPM	MPM Development Consultants
NAC	Natural Area Consulting
PASS	Potential acid sulphate soils
<i>Pc</i>	<i>Phytophthora cinnamomi</i>
PEC	Priority ecological community
PER	Public Environmental Review
RFA	Regional Forest Agreement
SLIPs NRM	Shared Land Information Platform – Natural Resource Management Portal
SRE	Short range endemic
TEC	Threatened ecological community
WA	Western Australia
WCWA	<i>Wildlife Conservation Act 1950 (WA)</i>

### 13. References

Amphibian Research Centre database accessed 1/9/2011:

[http://frogs.org.au/frogs/of/Western\\_Australia/](http://frogs.org.au/frogs/of/Western_Australia/)

Bradshaw, F. J, and Mattiske, E. M, (1997). *Forest Ecosystems Mapping for the Western Australian RFA*. Report to the Joint Commonwealth and Western Australian Regional Forest Agreement Steering Committee.

Bureau of Meteorology *Climate Statistics Climate database* accessed November 2011 from:

<http://www.bom.gov.au/climate/data/>

Climate Commission (2010) *Climate Change Impacts*, website accessed 15-11-11 from

<http://climatecommission.gov.au/topics/western-australia-climate-change-impacts/>

Commonwealth of Australia (1996) *The National Strategy for the Conservation of Australia's Biological Diversity*. Department of Environment, Sport and Territories, Canberra, ACT.

Christenson, P., Annels, A., Liddelow, G. and Skinner, P. (1985) *Vertebrate Fauna in the Southern Forests of Western Australia: A Survey*. Bulletin Vol. 94. Forests Department of Western Australia

Christensen, P. (1992). The Karri Forest – its Conservation Significance and Management. Department of Conservation and Land Management, Kensington.

Department of Conservation and Land Management and Conservation Commission of Western Australia (2005) *Shannon and D'Entrecasteaux National Parks Draft Management Plan*. Government of Western Australia.

Department of Environment and Conservation (2010), *Current List of Threatened Fauna (Specially Protected Fauna Notice 17 August 2010)*, available World Wide Web URL:

<http://www.dec.wa.gov.au/content/view/852/2010/>, accessed 09 November 2010.

Department of Environment and Conservation (2009). *Guide to the Assessment of Applications to Clear Native Vegetation under Part V of the Environmental Protection Act 1986*, Department of Environment and Conservation, Perth, Western Australia.

Department of Water 1:250 000 Hydrogeology Map Series (2001) Mapping dataset, Government of Western Australia.

Department of Water Public Drinking Water Supply Act (2001) Mapping dataset, Government of Western Australia.

Department of Water *100 year Floodplain Mapping Database*, available..... accessed August 2010.

Department of Environment (2006), *Acid Sulfate Soils Guidelines Series Identification and Investigation of Acid Sulfate Soils – May 2006*, Department of Environment, Perth, Western Australia..

Department of Environment and Conservation Volume 1 *Phytophthora cinnamomi* Management Guidelines (2003), Department of Conservation and Land Management, Western Australia..

Department of Environment and Conservation “*Management of Phytophthora and the disease caused by it. Policy statement No 3.December 1998*”. Department of Conservation and Land Management, Western Australia..

Department of Environment and Conservation (DEC) (2006) *List of Threatened Ecological*

*Communities on the Department of Environment and Conservation's Threatened Ecological Community (TEC) Database endorsed by the Minister for Environment, Species and Communities Branch.*

Department of Environment and Conservation (DEC) (2008) *Priority Ecological Communities for Western Australia.*

Department of Environment and Conservation (DEC) (2009) *'Draft Treatment and Management of Soils and Water in ASS Landscapes'* (2009). Department of Conservation and Land Management, WA.

Department of Fisheries, (2010), *Freshwater Fish Distribution, WA, Shannon River*, available World Wide Web, URL:

[http://freshwater.fish.wa.gov.au/mapcatchments.aspx?drainage\\_division\\_id=&Catchment\\_id=18&water\\_body\\_id=1215](http://freshwater.fish.wa.gov.au/mapcatchments.aspx?drainage_division_id=&Catchment_id=18&water_body_id=1215), accessed 09 November 2010.

Department of Sustainability, Environment, Water, Population and Communities, (2010a) *Environmental Reporting Tool*, available World Wide Web URL:

<http://www.environment.gov.au/apps/boobook/mapservlet?app=ert>, accessed 09 November 2010.

Department of Sustainability, Environment, Water, Population and Communities, (2010b) *Directory of Important Wetlands – Doggerup Creek System – WA104*, available World Wide Web URL:

<http://www.environment.gov.au/cgi-bin/wetlands/report.pl>, accessed 09 November 2010.

Department of Sustainability, Environment, Water, Population and Communities, (2010c) *Directory of Important Wetlands – Broke Inlet System – WA102*, available World Wide Web URL:

<http://www.environment.gov.au/cgi-bin/wetlands/report.pl>, accessed 09 November 2010.

Department of Sustainability, Environment, Water, Population and Communities, (2010d) *Directory of Important Wetlands – Gingilup-Jasper Wetland System – WA105*, available World Wide Web URL:

URL: <http://www.environment.gov.au/cgi-bin/wetlands/report.pl>, accessed 09 November 2010.

Department of Sustainability, Environment, Water, Population and Communities, (2010e) *Directory of Important Wetlands – Maringup Lake – WA106*, available World Wide Web URL:

<http://www.environment.gov.au/cgi-bin/wetlands/report.pl>, accessed 09 November 2010.

Department of Sustainability, Environment, Water, Population and Communities, (2010f) *Directory of Important Wetlands – Mt Soho Swamps – WA107*, available World Wide Web URL:

<http://www.environment.gov.au/cgi-bin/wetlands/report.pl>, accessed 09 November 2010.

*Environmental Protection Act 1986 (WA)*

*Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)*

Environmental Protection Authority (2009). *Guidelines for preparing a Public Environmental Review/Environmental Review and Management Programme*, Environmental Protection Authority, Perth, WA.

Environmental Protection Authority (EPA) (2002) *Terrestrial Biological Surveys as an Element of Biodiversity Protection*, Position Statement No. 3, March 2002.

EPA (2004) *Guidance for the Assessment of Environmental Factors, Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia*, Guidance Statement No 51 June 2004;

EPA (2010) *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*. EPA Guidance Statement September 2010.



Environmental Protection Authority (EPA) (2010). *Environmental Impact Assessment Administrative Procedures 2010 – Final Draft*. Retrieved 17/5/10 from: [www.epa.wa.gov.au/docs/3151\\_DraftAdministrativeProcedures2010%20 2 .pdf](http://www.epa.wa.gov.au/docs/3151_DraftAdministrativeProcedures2010%202.pdf)

Environmental Protection Authority (EPA). (2010). *Environmental Impact Assessment Guidelines No. 6: Timelines for Environmental Impact Assessment Procedures (Draft)*. Retrieved 19/4/10 from: [www.epa.wa.gov.au/docs/3150\\_Draft\\_EAG6\\_TimelinesforEIAofProposals\\_2.pdf](http://www.epa.wa.gov.au/docs/3150_Draft_EAG6_TimelinesforEIAofProposals_2.pdf)

Environmental Protection Authority (EPA). (2009). *Guide to preparing an Environmental Scoping Document*, Retrieved 17/5/10 from: [http://www.epa.wa.gov.au/docs/1919\\_5%20EIA%20Scoping%20Document%20Guide\\_1-11-04.pdf](http://www.epa.wa.gov.au/docs/1919_5%20EIA%20Scoping%20Document%20Guide_1-11-04.pdf)

Environmental Protection Authority (EPA). (2009). *Guidance Statement 41 Final Guidance on Assessment of Aboriginal Heritage*, Retrieved 17/5/10 from: [http://www.epa.wa.gov.au/docs/1026\\_GS41.pdf](http://www.epa.wa.gov.au/docs/1026_GS41.pdf)

Environmental Protection Authority *Section 38 EPA Referral Form* Retrieved 19/4/10 from: [http://www.epa.wa.gov.au/template.asp?ID=3&area=EIA&Cat=Referral+of+Proposals%2C+Scopin g+Document+%26+Environmental+Review+Document+Information+%28s38%29](http://www.epa.wa.gov.au/template.asp?ID=3&area=EIA&Cat=Referral+of+Proposals%2C+Scoping+Document+%26+Environmental+Review+Document+Information+%28s38%29)

Hewitt, C.N. and Elliot R (1999) Environmental Monitoring strategies. In R.Harrison (Chapter 7) *Understanding our Environment: an Introduction to Environmental Chemistry and Pollution*. Cambridge: Royal Society of Chemistry pp 267-329.

Gardner, C.A. (1979) *Eucalypts of Western Australia*, Western Australian Department of Agriculture, Bulletin 4013.

Geomorphic Wetlands, Augusta to Walpole, 2003 DEC Dataset available from Available via WA Atlas: [www2.landgate.wa.gov.au](http://www2.landgate.wa.gov.au)

Hearn, R., Williams, K. and Comer, S. (2002) *Warren (WAR- Warren)*, A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002, Department of Conservation and Land Management.

Hodgkin, E. and Clark, R. (1988) Wilson, Irwin and Parry Inlets the estuaries of the Shire of Denmark. *Estuarine Studies Series No 3*. Environmental Protection Authority, Perth, WA.

How, R.A, Dell J., and Humphreys W.F. (1987) *The ground vertebrate fauna of coastal areas between Busselton and Albany, Western Australia*. *Rec. West. Aust. Mus.* 1987, 13 (4): 553-574

Keighery, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA, Western Australia.

Kinnear, K., (2011), *Environmental Management Plan*, unpublished report prepared for Shellbay Holdings Pty Ltd.

Lindenmayer, D. and Burgman, M. (2005) *Practical Conservation Biology*, CSIRO Publishing, Victoria, Australia.

Mattiske, E.M., and Havel, J.J. (1998). *Regional Forest Agreement vegetation complexes*. Department of Conservation and Land Management, Kensington.

Mawson, P., (2011), Senior Zoologist, Department of Environment and Conservation, Perth, Personal Communication

Moore, G. (1998) *Soilguide. A handbook for understanding and managing agricultural soils*. Department of Agriculture, Western Australia. Bulletin No. 4343. Kathryn Kinnear, Personal Observations during field assessment August 2010.

Moore, J, and Wheeler, J. *Southern Weeds and Their Control*, Department of Agriculture.

Moore Mapping (2010), I. Moore unpublished report prepared for Shellbay Holdings Pty Ltd

MPM Development Consultants, (2011), C. Pippin, unpublished report prepared for Shellbay Holdings Pty Ltd.

Natural Area Consulting, (2011a), *Flora and Vegetation Assessment, Doggerup Road Reserve*, unpublished report prepared for Shellbay Holdings Pty Ltd.

Natural Area Consulting, (2011b), *Wetland Assessment, Doggerup Road Reserve*, unpublished report prepared for Shellbay Holdings Pty Ltd.

P. Keppel, J. Gillard and B. Barton Personal Communication to K. Kinnear from the DEC meeting held at DEC Manjimup 16/8/2010.

Shared Information Portal (SLIP) 2010 Department of Agriculture and Food, Regional Soil-Landscape Mapping. Retrieved 30/9/10 from:  
<http://spatial.agric.wa.gov.au/slip>

V & C Semeniuk Research Group (1997) Mapping and Classification of Wetlands from Augusta to Walpole in the South West of Western Australia. WRC Report

Western Australian Planning Commission (2009) *Augusta-Walpole Coastal Strategy*. Albert Facey House, 469 Wellington Street, Perth Western Australia.

Western Australian Museum database accessed 1/9/2011:  
<http://frogwatch.museum.wa.gov.au/Southwest/SouthwestForests/default.aspx>

Webb, W (2011) on site discussions with Kathryn Kinnear during Heritage Assessment February 2011.

Wilson, I., (2010), Fauna Officer, Department of Environment and Conservation, Pemberton, Personal Communication