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

Public Environmental Review
Assessment No 1836
Appendices 1 to 9

Prepared By:
Kathryn Kinnear
Bio Diverse Solutions

Appendices

Appendix 1 – Correspondence

Appendix 2 – Engineering Assessment, MPM Development Consultants

Appendix 3 – Environmental Management Plan, Bio Diverse Solutions

Appendix 4 – Acid Sulfate Soils Investigation, Bio Diverse Solutions

Appendix 5 – Wetland Assessment Report, Natural Area Consulting

Appendix 6 – Flora Report Natural Area Consulting

Appendix 7 – Malimup Access Dieback Report, Moore Mapping

Appendix 8 – Preliminary Fauna Report, Bio Diverse Solutions

Appendix 9 – Aboriginal Heritage and Native Title

Appendix 1

Correspondence

Shire of
Manjimup

PO Box 1 Cnr Rose & Knockmore Street
Manjimup Western Australia 6258
Telephone: (08) 9771 7777
Facsimile: (08) 9771 7771
Email: mail@manjimup.wa.gov.au
Website: www.manjimup.wa.gov.au
A.B.N. 364 333 196 91

Our Ref: P56000, WRK6/2
Your Ref: 1593
Enquiries: Doug Elkins

16 November 2010

Peter Driscoll
Principal Planner, Landvision
Suite 5, 16 Nicholson Road
SUBIACO WA 6008

Dear Peter

ACCESS TO NELSON LOCATION 7965 VIA DOGGERUP ROAD

I refer to your letter dated 28 September 2010 regarding the above mentioned issue.

Council resolved in December 2002 to approve the upgrade of Doggerup Road, subject to standard conditions. Without another contrary resolution, I confirm that Council's position is still an approval for the works.

As you will appreciate, the current situation is a frustration to the Shire. The road reserve is a legal road reserve and was created with the intent of a road being constructed within the reserve, with consequential loss of vegetation and crossing of wet lands. A later dedication of the surrounding land as National Park was in the knowledge of the existence of the road reserve and the freehold lot it services. While it is appreciated that the road reserve severs National Park, it is not accepted that this is reason to prevent the use of a reserve that pre-existed the park, for its intended purpose. Council's position is that the proposed works are minor and further approvals should not be required.

However, while Council supports and approves the road construction within the legal road reserve, Council is bound by the requirements of the *Environmental Protection Act 1986*. In addition, I have no reason to believe that Council would not support an alternative alignment that provided a better environmental outcome, while providing the access your client requires. Accordingly, should another alignment prove superior and capable of environmental clearance, I would anticipate Council support for the dedication of a new road and the closure of Doggerup Road.

I confirm Council's support for construction of a road within the Doggerup Road reserve, however, this support should not be taken to exclude alternatives.

If you have any enquiries please do not hesitate to contact me by phone 97717777 or email info@manjimup.wa.gov.au

Yours sincerely

Doug Elkins
DIRECTOR WORKS

WALCO WESTERN AGRICULTURAL LIME COMPANY (AUSTRALIA)
A.B.N. 56 738 954 183

PO BOX 40
PEMBERTON WA 6260

PHONE: 08 9776 1206
FAX: 08 9776 1486
Email: walco@westnet.com.au

WALCO
LIME SUPPLIES

7th November 2011

Terry Court
Co-Director
Shellbay Holdings Pty Ltd
PO Box 297
Pemberton 6260

Re - Supply of Limestone Road Base

Dear Terry,

In response to your enquiry on behalf of Shellbay Holings Pty Ltd for the supply of limestone road base for construction of your access road to Nelson Location no. 7965 (Sandy Peak).

We have suitable material available from our limestone quarry at Windy Harbour.

When confirmed please forward your volume requirements (I estimate approx six to seven thousand cubic metres) and I will submit a cost for supply and delivery to the above location for you to consider.

Yours faithfully

Keith Jackson

2/9

62

176F3214
N. Ryan
340220

The Manager
BA & CA Owens Pty Ltd
PO Box 611
MANJIMUP WA 6258

Att: BA Owens

Dear Sir

ACCESS TO LOCATION 7965 -- D'ENTRECASTEAUX NATIONAL PARK

I refer to your letter of 27 April 1995 seeking approval for change to the surveyed/ gazetted access to location 7965. Please except my apologies for the delay in responding.

CALM does not support your proposal for access to location 7965 from Salmon Beach Road. The proposal is not in accordance with the CALM 1987 D'Entrecasteaux National Park Management Plan.

Any construction of access to location 7965 and future development of the property will have considerable impact on the adjoining D' Entrecasteaux National Park. In particular:

* protection of rare and priority flora
* introduction and spread of dieback
* introduction and spread of weeds
* impairment of landscape character
* restriction of access to the Doggerup Sandstone
* Aboriginal heritage
* its listing on the register of the National Estate

In addition, the publication *Archaeological Investigation of Aboriginal Site D'Entrecasteaux Park 1995* by C Dortch recommends:

* "any development in the Doggerup Creek areas of D' Entrecasteaux National Park be preceded by intensive archaeological survey to detect archaeological sites buried by dunes or hidden by dense vegetation"
* "owners and caretakers of nearby private properties should not be allowed vehicle access through the Black Head locality"

ok
2/9 + 1/3

* "any develoment and archaeological sampling must be preceded by application for approval through the Aboriginal Affairs Department".

In relation to development of the current surveyed access to location 7965, environmental approval will be required to undertake any clearing or development works that may impact on the values of the adjoining national Park. It is suggested that you seek the advice of the Department of Environmental Protection prior to commencing any work in the area. In addition, contact should also be made with the Commissioner of Soil Conservation, the Manjimup Shire and the Department of Aboriginal Affairs.

If you have any further queries please contact John Gillard at the CALM Pemberton Office (ph: 097 761 207).

Yours faithfully

for Syd Shea
EXECUTIVE DIRECTOR

15 November 1995

ORIGINAL

c.c Reg ⊢ manager, Manjimup

ENTERED

ACTION	NOTE
RWH	
HCV	
LRW	
BRING UP	

16 NOV 1995

Government of **Western Australia**
Department of **Environment and Conservation**

Your ref:
Our ref:
Enquiries: 2010/002254
Phone: Bianca Hoffmann
Fax: 9333 7587
Email: 9333 7575
Bianca.Hoffmann@dec.wa.gov.au

Ms Kathryn Kinnear
Bio Diverse Solutions
55 Peppermint Drive
Albany, WA 6330

Dear Ms Kinnear,

Doggerup Road Reserve, Shire of Manjimup

Thank you for your submission of the report entitled "Acid Sulfate Soil Investigation" (Bio Diverse Solutions, April 2011) (the Report) to the Contaminated Sites Branch (CSB) of the Department of Environment and Conservation (DEC). The report was received on 31 August 2011.

It is understood that the road proposal was submitted to the EPA in April 1997 and then withdrawn in December 2002. A more recent proposal was submitted to EPA on 13 October 2009 after which the EPA requested the proponent submit an Environmental Scoping Document as part of the Environmental Review process. This Acid Sulfate Soil Investigation forms part of the environmental review.

CSB understands that a single-lane limestone track is proposed to be built on gazetted road "Doggerup Road" between Windy Harbour Road and Nelson Location 7965. Nelson Location 7965 is privately owned by Shellbay Holdings Pty Ltd and is surrounded by D'Entrecasteaux National Park. It is understood that, at present, Nelson Location 7965 can only be accessed via a DEC management track that is impassable during winter months. A single-lane limestone track will be serviceable in all weather and allow access to Nelson Location 7965 all year round.

CSB is aware that the soil investigations were limited due to property access. However, given that no soil disturbance is anticipated across the wetland areas where potential acid sulfate soils where identified and that the track will be made of limestone (a material which neutralises acidity) CSB considers that the management measures are suitable for the proposed works.

Please contact Bianca Hoffmann, Environmental Officer of CSB, on 9333 7585 if you have any queries in relation to the above.

Yours sincerely

Andrew Miller
A/MANAGER
CONTAMINATED SITES BRANCH

21 September 2011

c.c. Shire of Manjimup
c.c. DEC South Coast Region

Attachment 1: Site location figure

cls
complex land solutions pty ltd
ABN 66 081 704 378
land tenure & property specialists

Our Ref: CLS 21838

21 December 2011

Ms Kathryn Kinnear
Bio Diverse Solutions
55 Peppermint Drive
ALBANY WA 6330

Dear Kathryn

DOGGERUP ROAD, SANDY PEAK (SHIRE OF MANJIMUP)

As requested we undertook investigations in respect to the creation of the above mentioned road and as such we advise the following:

1. Doggerup Road was created pursuant to a subdivision of Nelson Locations 7491 to 7541 inclusive and 7771 to 7773 inclusive and 7203 as shown on Landgate Plan 225815 (refer to copy attached). This occurred in 1911. Doggerup Road extended from Windy Harbour Road to the area marked as "Sand Drift" shown on the said Plan.

2. It appears that subsequent to the creation of the Lots and the dedication of Doggerup Road these Lots reverted back to the Crown to form part of what is now D'Entrecasteaux National Park (refer to copy of DP 52588 attached). It is to be noted however, Doggerup Road continued to be shown as a dedicated road. It was subsequently shown as the legal access to the creation of Nelson Location 7965 (the subject land). This Location was created pursuant to a Crown Grant on 17 December 1948 and was granted to Clayton Ashley Blechynden (refer to copy Certificate of Title Volume 1114 Folio 70 attached).

   The Crown Grant was issued pursuant to the *Transfer of Land Act 1893* and would only have been granted by the Crown on the basis that the said Location was provided with legal access. The Crown would not have issued a Crown Grant for the land whereby doing so would have created a landlocked parcel.

3. On checking with the policy of the Department of Regional Development (formerly State Land Services) in respect to the closure of gazetted roads, we have been advised that it is not the policy of the Department to close a gazetted road that provides legal access to a lot or in this case Nelson Location 7965 without the provision of an alternative legal access being created.

PO Box 613
Joondalup WA 6919
Unit 1, 9 Mercer Lane
Joondalup WA 6027

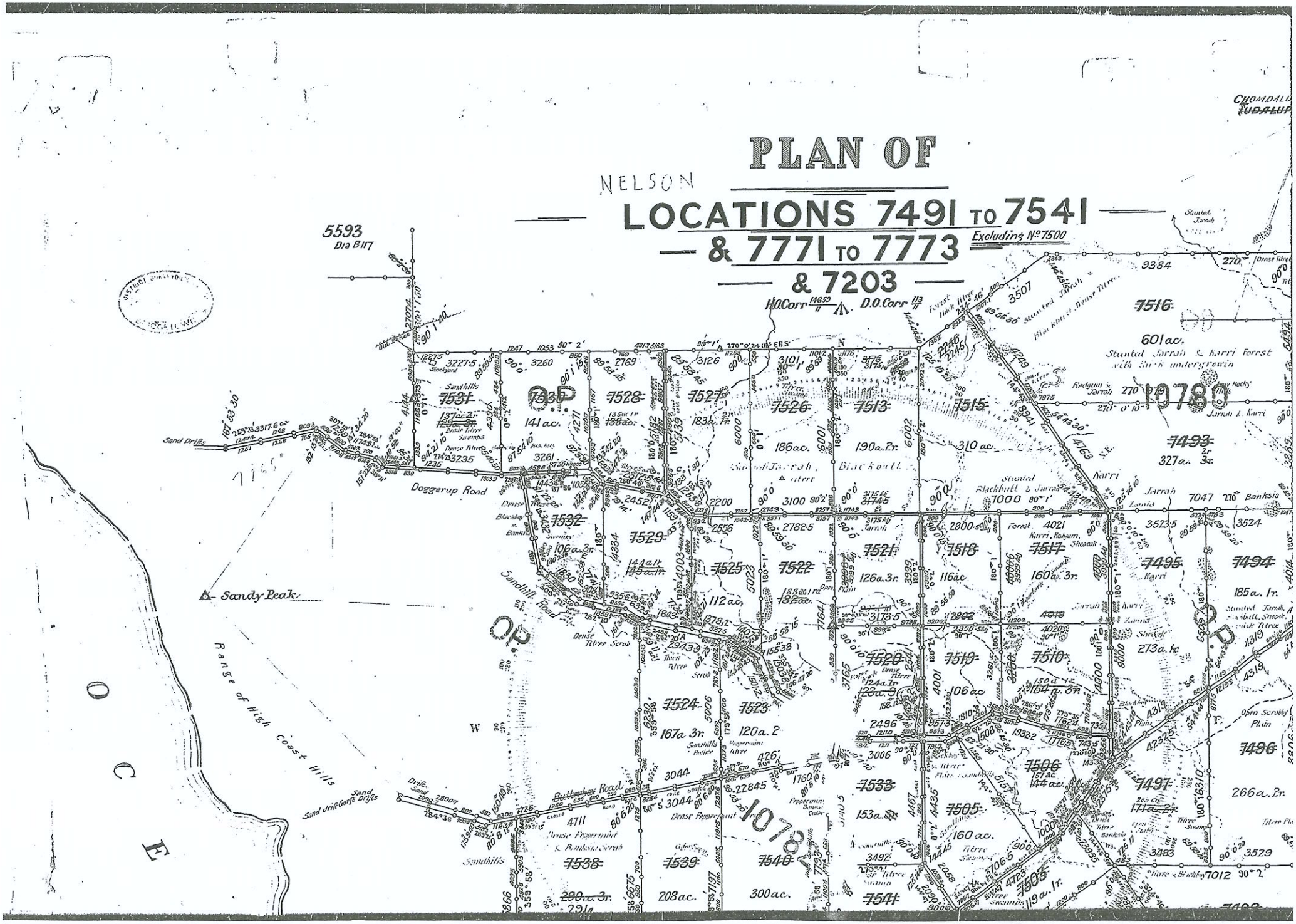
p 9300 0022
f 9300 2424
office@complexls.com.au

4. As previously discussed, the creation of an alternative road would require to be created through the existing National Park and therefore would require compliance pursuant to *section 45 of the Land Administration Act 1997 (refer copy attached).*

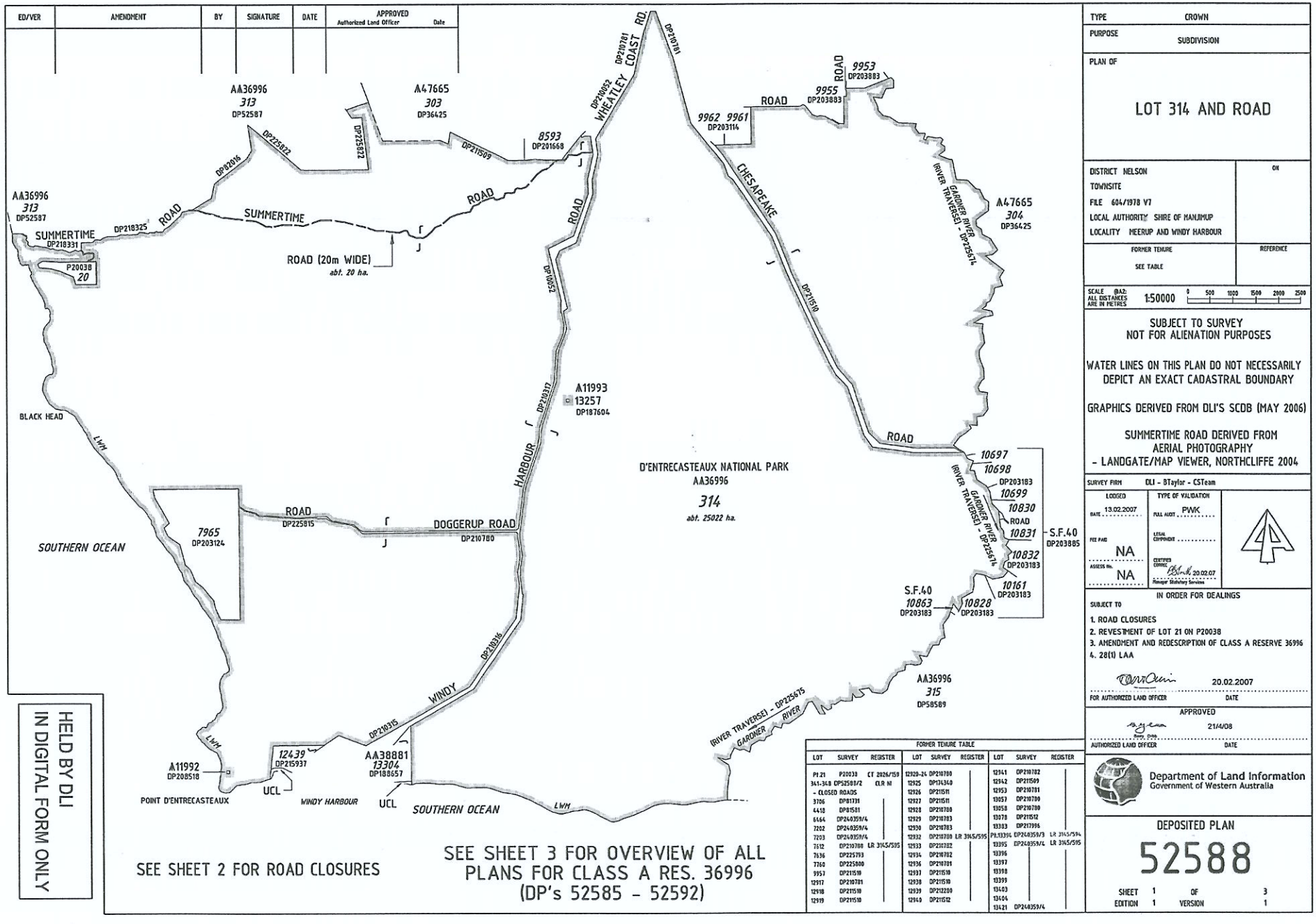
Should you require any further information in respect to the abovementioned matter please contact Frank Borrello of this office.

Yours sincerely
COMPLEX LAND SOLUTIONS PTY LTD.

Frank Borrello
Director



PLAN 225815



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INDEXED.
LANDS.

ORIGINAL

OFFICE OF TITLES
FEE PAID

WESTERN AUSTRALIA.

INDEXED.
Land
Permit
Lease
Name

REGISTER BOOK.
Vol. 1114 Folio 70

undivided ... share alone remains

George the Sixth, by the Grace of God, of Great Britain, Ireland, and the British Dominions beyond the Seas, King, Defender of the Faith. To all to whom these Presents shall come, Greeting: Know Ye that We, of Our especial Grace, certain knowledge, and mere motion, have given and granted, and We do by these Presents, for Us, Our heirs and successors, in consideration of the payment of the sum of £ 370 : 19 : 9 ------------- and the fulfilment of the prescribed conditions to the satisfaction of Our Governor of Our State of Western Australia, Give and Grant unto

Clayton Ashley Blechynden of "Glenpennant" Manjimup Farmer

CANCELLED

(hereinafter called the Grantee), the natural surface and so much of the land as is below the natural surface to a depth of two hundred feet of ALL THAT Tract or Parcel of Land situate and being in the District of Nelson ---------------- , in Our said State, containing 872 acres 3 roods 26 perches ------------------------------- more or less, and marked and distinguished in the Maps and Books of the Department of Lands and Surveys of Our said State as Nelson Location 7965 ---------------- and as the same is delineated and coloured green in the plan drawn hereon; together with all Profits, Commodities, Hereditaments, and Appurtenances whatsoever thereunto belonging, or in anywise appertaining: To have and to hold the said Tract or Parcel of Land to the depth aforesaid, and all and singular the Premises hereby granted, with their appurtenances, unto the said Grantee, in fee simple; Yielding and Paying for the same to Us, Our heirs and successors, one peppercorn of yearly rent on the twenty-fifth day of March in each year, or so soon thereafter as the same shall be lawfully demanded: Provided, nevertheless, that it shall at all times be lawful for Us, Our heirs and successors, or for any person or persons acting in that behalf by Our or their authority, to resume and enter upon possession of any part of the said land which it may at any time by Us, Our heirs and successors, be deemed necessary to resume for roads, tramways, railways, railway stations, bridges, canals, towing paths, harbour or river improvement works, drainage, or irrigation works, or quarries, and generally for any other works or purposes of public use, utility, or convenience, and for the purpose of exercising the power to search for minerals hereinafter reserved, and such Lands so resumed to hold to Us, Our heirs and successors, as of Our or their former estate without making to the said Grantee, or any person claiming under him , any compensation in respect thereof, and that no otherwise than is provided by section 4 of the Land Act Amendment Act, 1920, so nevertheless, that the land so to be resumed shall not exceed one-twentieth part in the whole of the lands aforesaid, and that no such resumption be made of the part of any lands upon which any buildings may have been erected, or which may be in use as gardens, or otherwise, for the more convenient occupation of any such buildings, without compensation: And provided, also, that it shall be lawful at all time for Us, Our heirs and successors, or for any person or persons acting in that behalf, by Our or their authority, to cut and take away any such indigenous timber, and to search and dig for and carry away any stones or other materials which may be required for making or keeping in repair any roads, tramways, railways, railway stations, bridges, canals, towing-paths, harbour works, breakwaters, river improvements, drainage or irrigation works, and generally for any other works or purposes of public use, utility, or convenience, without making to the said Grantee, or any other person claiming under him , any compensation in respect thereof; and we do hereby save and reserve to Us, Our heirs and successors, all Mines of Gold, Silver, Copper, Tin, or other Metals, Ore, and Minerals, or other substances containing Metals, and all Gems or Precious Stones and Coal or Mineral Oil and all Phosphatic Substances in and under the said land, with full liberty at all times to search and dig for and carry away the same; and for that purpose to enter upon the said lands or any part thereof.

CT 1114 0070 F

Cancelled

In witness whereof We have caused Our trusty and well-beloved The Honourable Sir James Mitchell, Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Lieutenant-Governor in and over the State of Western Australia and its Dependencies, in the Commonwealth of Australia, to affix to these Presents the Public Seal of the said State.

Sealed this 16th day of December, One thousand nine hundred and forty-Eight

James Mitchell
Lieutenant-Governor.

Grant under the Land Act, 1898, and Amendments.

ENTERED ON RECORD this 17th day of December 1948

Thorn
Minister for Lands.

for Minister for Lands.

CANCELLED

Certificate of Title under the Transfer of Land Act, 1893.

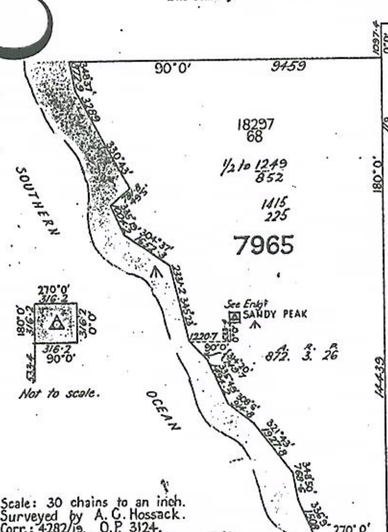
The abovenamed Grantee is now the registered proprietor of an estate in fee simple subject to the easements and encumbrances notified hereunder in all the land described in this grant.

Dated Twentieth day of December, One thousand nine hundred and forty Eight

ASST. REGISTRAR OF TITLES.

The bearings on the Plan below are true or thereabouts, the measurements more or less, and a post has been placed at each corner of the Location.

PLAN HEREIN REFERRED TO:



Scale: 30 chains to an inch.
Surveyed by A. C. Hossack.
Corr.: 4282/19. O.P. 3124.
454/80.D3; 454 B/40.D2.
Ex'd:

Transfer 17117/1949. Transferred to Douglas Knapton Johnston and Lindley Pointz Muir both of Manjimup Farmers, as tenants in common in equal shares. Registered 9th November 1949 at 10.45 o'c

ASSISTANT REGISTRAR OF TITLES.

As to the one undivided half share of Douglas Knapton Johnston only. Application 2878/1961. On the 12th October 1958 Douglas Knapton Johnston died and on the 20th July 1959 Probate of his Will was granted to Jessie Etna Johnston of Manjimup, Widow, the executrix therein named.

7th July 1961. ASSISTANT REGISTRAR OF TITLES.

Transfer 9930/1961. The one undivided half share of Jessie Etna Johnston as Executrix is now transferred to Jessie Etna Johnston and a separate certificate issues. Registered 7th July 1961 at 9.12 o'c.

CANCELLED 1249-852

REGISTRAR OF TITLES

B 11096. 7

TOTALLY CANCELLED
TRANSFER B 11097
Registered 22nd August 1975 at 9.00 OC
To Vol. 1415 Fol. 225.

Harry Paine
Acting Surveyor General.

For encumbrances and other matters affecting the land see back.

LANDGATE COPY OF ORIGINAL NOT TO SCALE Mon Jun 20 11:33:08 2011 JOB 36984568

EASEMENTS AND ENCUMBRANCES REFERRED TO

Caveat A952138. Lodged 23-4-1975 at 3.43 o'c.

Withdrawal B11096 of Caveat A952138. Lodged 22-8-1975 at 9.00 o'c.

Cancelled

CT 1114 0070 B

CROWN GRANT.

Vol.....Fol.....

Western Australian Consolidated Acts

LAND ADMINISTRATION ACT 1997 - SECT 45

45. Relationship between this Part and the *Conservation and Land Management Act 1984* and the *Swan and Canning Rivers Management Act 2006*

(1) In this section —

class A nature reserve means nature reserve which is a class A reserve;

conservation park , ***national park*** and ***nature reserve*** have the same respective meanings as they have in the *Conservation and Land Management Act 1984* .

(2) If land is reserved under section 41 for the purpose of a conservation park, national park or class A nature reserve, the Minister may, with the consent of the Minister to whom the administration of the *Conservation and Land Management Act 1984* is for the time being committed by the Governor, by order —

(a) add Crown land to such a reserve;

(b) amend such a reserve for the purpose of correcting one or more unsurveyed boundaries of that reserve in such a manner that the area of that reserve, if reduced at all, is reduced by not more than 5%;

(c) excise 5% or one hectare, whichever is the less, of the area of such a reserve for the purpose of public utility services;

(d) redescribe locations or lots, or adjust the areas of locations or lots, in such a reserve if the external boundaries of that reserve remain unchanged; or

(e) amalgamate 2 or more such reserves which have similar purposes and the same management body.

(3) Subject to subsection (2), land that is reserved under section 41 for the purpose of a conservation park, national park or class A nature reserve remains so reserved for that purpose until, by an Act in which that land is specified, it is otherwise enacted.

(4) Subject to subsection (5), if the Minister proposes to excise an area from a reserve referred to in subsection (2) for the purpose of creating a road, the Minister must cause that proposal to be laid before each House of Parliament and section 43(1) then applies.

(5) The Minister must, not less than 30 days before acting under subsection (2) or (4) in relation to a reserve referred to in that subsection, advertise his or her intention so to act in a newspaper circulating throughout the State.

(6) In respect of land in the development control area or Riverpark as defined in the *Swan and Canning Rivers Management Act 2006* , the Minister must consult the Swan River Trust before —

(a) any such land is reserved under section 41; or

(b) the purpose of any such land that is a reserve is cancelled or changed, or the area of that land is altered otherwise than by addition thereto, under this Part.

[Section 45 amended by No. 52 of 2006 s. 6.]

Australian Government
Department of Sustainability, Environment, Water, Population and Communities

Mr Barry and Carol Owens
Shellbay Holdings Pty Ltd
5 Hovea Street
Manjimup WA 6258

Cc Ms Kathryn Kinnear
Bio Diverse Solutions

Date: 3 February 2012
EPBC Ref: 2011/6121
EPBC contact: Dionne Cassanell
02 6274 2114
dionne.cassanell@environment.gov.au

Dear Mr Barry and Carol Owens

All weather access track road between Windy Harbour and Nelson Location 7965, WA (EPBC 2011/6121)

I refer to the department's letter dated 20 January 2012, in which we advised the above proposed action is a controlled action under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and the email from your consultant Ms Kathryn Kinnear, Bio Diverse Solutions, dated 23 January 2012.

As indicated in the department's letter, while we have determined that your project will be assessed by preliminary documentation, we require further information to be able to assess the relevant impacts of the action.

It is noted from the email, dated 23 January 2012, that no feed or habitat trees are going to be touched, removed or disturbed. The department considers all habitat that could potentially be utilised for foraging and breeding for Baudin's Black Cockatoo *(Calyptorhynchus baudinii)*, Carnaby's Black Cockatoo *(Calyptorhynchus latirostris)* and Forest Red-tailed Black Cockatoo *(Calyptorhynchus banksii naso)* (Black Cockatoos) is important, regardless of whether they are currently being utilised. Based on the above, the department is of the view that the 6.5 ha of habitat to be cleared, approximately 3.25 ha is considered potential foraging and breeding habitat for Black Cockatoos.

It is further noted from the Engineering Assessment Report that the road would be constructed with a series of guiding principles, rather than undertaking a completely engineered design which would enable flexibility during construction to ensure that the track footprint and any clearing are minimised. The department would expect the road design and construction method, including management measures to be fully documented.

Given the above, please provide information on the monitoring and management measures to be implemented during and post construction, to avoid hydrological changes, bush fire, erosion, weeds and spread of *Phytophthora cinnamomi (*Dieback), in order to minimise fragmentation, loss and degradation of habitat for Black Cockatoos and Balston's Pygmy Perch (*Nannatherina balstoni).* The department understands that a Construction Management Plan is proposed. You may wish to consider including the above information in this Plan and providing the Plan to the department.

It is noted that rehabilitation and revegetation is proposed to reduce erosion and degradation, however the department would expect additional mitigation measures to be implemented to compensate for the clearing of up to 3.25 ha of potential breeding and foraging habitat for Black Cockatoos, such as the revegetation of that habitat.

Finally, it is noted that you have prepared an Environmental Management Plan. we would appreciate you providing a copy to the department for inclusion in the Preliminary Documentation.

If you have any questions, please contact the EPBC project manager and quote the EPBC reference number shown at the beginning of this letter.

Yours sincerely

C Voutas

Con Voutas
Director
Western Australia South Australian Section

Appendix 2

Engineering Assessment & Specification

MPM Development Consultants 2010

Town Planning

Engineering

Project Management

Engineering Assessment

Doggerup Road, Windy Harbour

Prepared for

Shellbay Holdings (December 2010)

development consultants

T 08 9721 4777 | **F** 08 9721 4666

Unit 1 / 33 Constitution Street Bunbury WA 6230

E reception@mpmdc.com.au | **W** www.mpmdc.com.au

DOCUMENT CONTROL

TITLE

Engineering Assessment – Doggerup Road, Windy Harbour

Author (s) : Craig Pippin

Reviewer (s) : Kathryn Kinnear (Biodiverse)

Job No. : 10- 067 - BIO

Client : Shellbay Holdings Pty Ltd

REVISION

Revision	Summary	Revised by	Approved by	Date
A	Biodiverse, for Approval	CP	CP	12/2010
B	Hardcopy issued	CP	CP	06/2011

TABLE OF CONTENTS

1.0 Introduction

This engineering assessment has been prepared by MPM Development Consultants for use by Biodiverse Solutions as additional information to the environmental scoping document prepared for the application for the construction of an access track within the existing Doggerup Road reserve. The purpose of the track will be to provide an all weather access for the owners of Nelson Loc 7965 only from the existing Windy Harbour Road.

This engineering assessment provides solutions and general guidance for the design and construction of a suitable track that will minimise the extent of disturbance to the existing flora and fauna within the Doggerup road reserve. This assessment provides specific solutions to the varying conditions that presently exist along the length in relation to existing vegetation, drainage crossings, rock, habitat trees and other specific areas of environmental concern.

2.0 General Specification

It is proposed to construct a 3.0m wide compacted limestone roadbase material track. The track will be constructed in summer (dry) conditions only, will be located within the existing Doggerup Road reserve to avoid any existing mature or potential habitat vegetation and will be designed to create a low speed environment. The purpose of the track will be to provide all weather, year round access to Nelson Loc 7965 only. It is proposed that the track will not be open to the general public in order to restrict the number of vehicles utilising the track.

The track was partially formed and graded by the Shire in the 1960's. There remains evidence of gravel material and roadside drains on several sections of the track through the Karri.

The track will consist of limestone roadbase material placed on the existing ground surface and compacted to a thickness of 300mm. The 3.0m width approximates the existing cleared width of the track along several existing sections track, the construction of the all weather surface will thereby minimise any further disturbance to fringing or regrowth vegetation that has occurred since previous clearing operations along the track.

The natural ground surface along the length of the existing track and road reserve is only 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. The premise will be to minimise earthworks and restrict the area of disturbance.

3.0 Track Specification

The proposal for the track access on Doggerup Rd is to minimise the impact of providing essentially a private access driveway for Loc 7965 by mandating the type of construction to the absolute minimum possible in order to protect the maximum area of vegetation and natural environment within the existing public road reserve.

Preliminary discussion with the Shire of Manjimup have indicated that they do not wish to have a rural type road constructed within the existing road reserve, 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 Environmental Scoping Document or is wanted by the owners of Loc 7965.

It would be proposed to construct the track with a series of guiding principles rather than undertaking a completely engineered design, this would enable flexibility during construction to ensure that the track footprint and any clearing are absolutely minimised.

The track would be constructed on top of the existing surface with only minimal clearing of the track footprint carried out prior to laying and compaction of the limestone. This is not the ideal or preferred method of track construction as it will lead to pavement failure due to non compaction of the surface prior to the pavement being placed and the eventual decay of the organic material that will remain beneath the limestone; however this method of construction will ensure a minimal construction activity will occur. It will also allow for compaction of the underlying soils over a period of time, during road use rather than the underlying root systems being compacted before the limestone is placed and then after the limestone is placed. This will result in a track that will have maintenance issues over its life and will require improvements after the first year when the limestone settles. It is envisaged that the owners of Loc 7965 will undertake this maintenance for the Shire and the DEC.

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.

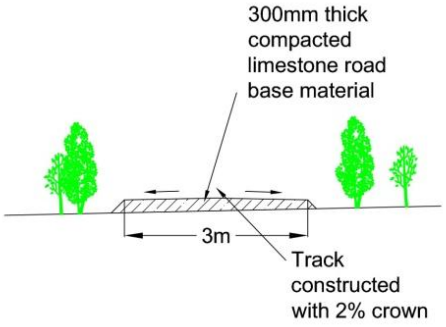
Photograph 1, shown here is of the nearby Summertime Track and provides an indication of the type of construction proposed for Doggerup Rd. The limestone material is placed on top of the existing ground surface without the formation of defined roadside drains. Note is also made here regarding how the approach to water crossings is made, where an existing water crossing is located beneath the guide posts in the photograph.

Photograph 2, shown here is D'entrecasteaux Road within the Windy Harbour townsite. A 3.0m wide limestone track with the vegetation regrowth occurring right up to and even overhanging the track. It should be noted that the track is constructed to take higher traffic volumes than that proposed for Doggerup Rd and has minimal track width, no defined drainage and the track elevated above natural surface level by the actual track pavement.

The track is proposed to be constructed in a the same manner as the above two local tracks, with the slightly undulating land, minimal crossfall there is no need for large areas of earthworks thus allowing the limestone roadbase to be simply placed directly onto the natural surface. The only area of disturbance will therefore be generally minimised to directly beneath the actual track only.

The marginal cross fall of the existing surface will be accommodated by permitting the limestone roadbase material to be marginally thicker on one side of the track compared to the other or having the proposed track finished surface crossfall match the crossfall of the natural surface.

The general track design cross section is shown here in Figure 1.



General Track Cross Section
Not to Scale

It is proposed to source the limestone road base material from within Loc 7965, to minimise the cartage distance required and the affect of large supply trucks will have on the track construction, refer section 3.1.5. The limestone material will be tested to ensure no deleterious materials or potential contaminants are brought into the track area and that the material is a suitable road construction material.

Photograph 3 shows a general view of the existing track and road reserve through the Karri forest area. A partially accessible track is existing with regrowth occurring very close to the track and within the existing road reserve.

Photograph 4 is another general track condition view, but it highlights the large potential habitat trees. The existing track alignment is shown to already avoid these trees and the proposed track alignment would also be varied to ensure all potential habitat tress remain and any clearing is absolutely minimised. This photo is also taken in the area where there is evidence is of the previous gravel pavement, as highlighted in Photograph 5 below.

Photograph 6 provides a view of the existing track through the sedgeland (open area after Karri forest). The photo clearly shows the existing track and cleared sedgeland it also provides an indication of the sandy subgrade which would provide a suitable base for the track. The existing sandy material also has reduced potential erosion issue.

Photograph 7, shown here provides a general existing track view through the Jarrah area and clearly indicates an existing track and the extent of existing clearing. The photograph also provides an indication of the crossfall on the existing natural surface.

Photograph 8, shows the existing and proposed intersection point with Windy Harbour Rd, a cleared 3.0m width is not currently available however only minor regrowth clearing would be required and minimised to ensure the minor access nature of Doggerup Rd is maintained. It is envisaged that the Doggerup Rd would be deemed by the Shire of Manjimup as a closed public road with access only permitted by DEC and the owners of Loc 7965. The method of restricted access could be discussed further with DEC however an option may be to install a DEC management gate, as per Wheatley Coast Rd and photograph 22, following.

As can be seen all through the above photographs, by keeping the track to the existing extent of clearing and placing the limestone road base material onto the existing natural surface levels, minimises the extent of earthworks and therefore the extent of areas that will be susceptible to erosion.

4.0 Drainage Specification

The issue of stormwater drainage needs to be carefully considered in the construction of the Doggerup Rd track. The purpose of the tracks construction is to ensure an all weather access to loc 7965 however the provision of the track could potentially affect the existing surface water flows and infiltration. The track will be constructed of limestone road base; although not completely pervious as per sand the limestone will offer a trafficable surface with greater permeability than gravel with its higher clay content.

As per Figure 1, the track will have a crossfall, preferably crowned crossfall spreading water either side of the track or a single one way crossfall that would follow the existing natural surface profile. As previously discussed the existing terrain is slightly undulating with minimal crossfall 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 and potential drainage crossing.

The drainage associated with the track is also helped by minimising the track footprint; less water is generated and with the absolute minimum clearing the water that is generated is not directed towards bare areas of soil but into the existing vegetation, significantly reducing potential erosion issues.

The existing/proposed water crossings are all generally at generally at 90 degrees to the water flow direction, which will mean the track will not have to divert out of the road. This will considerable reduce the extent of existing vegetation disturbance and therefore any clearing that may have been required to facilitate a perpendicular and level water crossing.

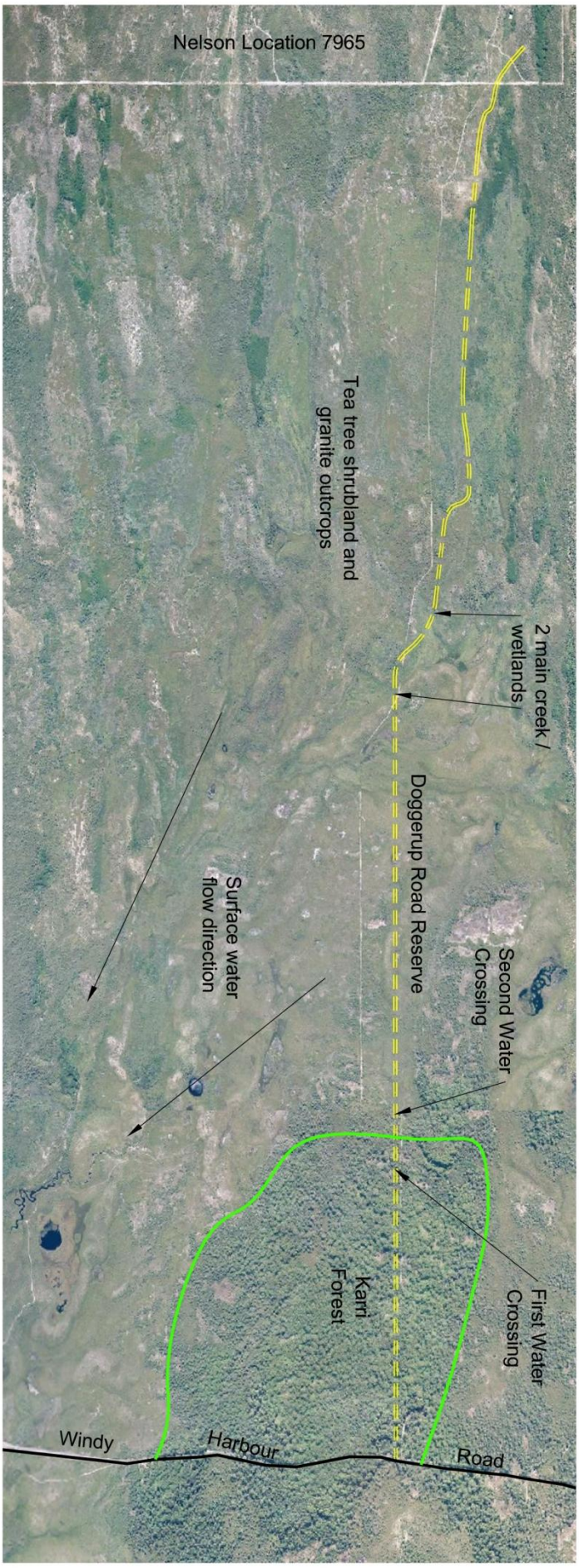
In order to ensure that an all weather access is provided it is proposed to increase the thickness of limestone road base to a minimum 500mm at water crossings. By constructing the crossings out of limestone this will ensure that any earthworks required are absolutely minimised, as the existing material will not be disturbed.

It is proposed to construct the required water crossings in an identical manner to that of existing tracks and roads within the area.

Photograph 9 here shows the existing water crossing on the nearby Summertime Track. The crossing shows multiple culverts with concrete filled sandbags as scour protection.

Photograph 10, shows an existing culvert crossing installed by the Shire of Manjimup on Windy Harbour Rd. Note is made of the use of reinforced concrete pipework and the Main Roads standard guidepost as a vehicle notification of the crossing.

In order to provide accurate information on how the proposed Doggerup Rd track will affect and be addressed each of the water crossings is shown and detailed as follows. A location plan is attached here to provide the approximate location of each of the water crossing points, as detailed in a site inspection of the road reserve in October 2010.



Water Crossing Location Plan

Do Not Scale

mpm

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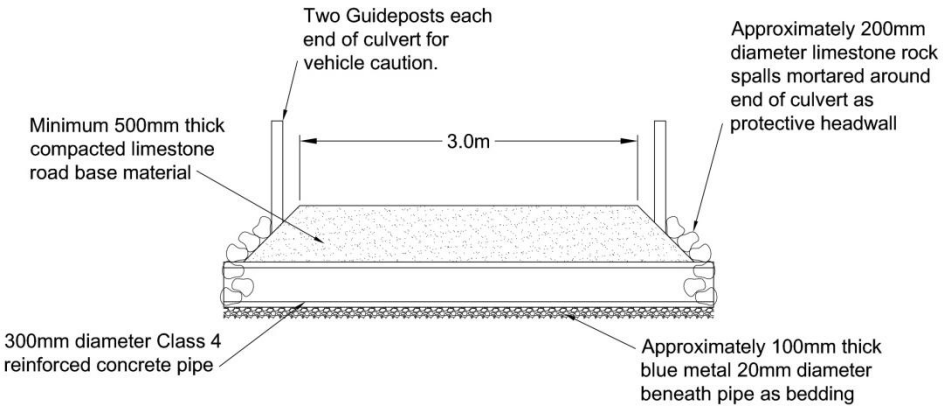
4.1 First Water Crossing

The first water crossing is located at the edge of the Karri forest and just into the tea tree shrubland as can be seen in photograph 11. The catchment contributing to the crossing appears to be small both on site and upon review of the general aerial contours of the area. The water crossing as shown in photograph 11 was flowing at the time of the October inspection as considerable rainfall was received the day before, however flow depth was only approximately 30mm. The survey stakes, as seen in the photograph were placed in winter 2010 to provide an extent of surface water and/or water flow therefore flow could be expected to be upto 150mm deep. As can be seen by the reflection in the water in the photograph, flow velocity was very low mainly due to the limited slope in the drainage channel. It is expected that a single 300mm diameter pipe culvert would be sufficient to handle the majority of flows for this water crossing, however a detailed catchment design for culvert sizing will be carried out prior to construction being undertaken, using the principles as outlined in Australian Rainfall and Runoff.

The pipework would be laid at a very flat grade approximately 1 vertical to 350 horizontal; this grade will permit flow but will not create velocity and potential scour issues.

A generic cross section detail, shown as figure 2 has been prepared to show how the water crossing would be undertaken.



First Water Crossing Cross Section
Not to Scale

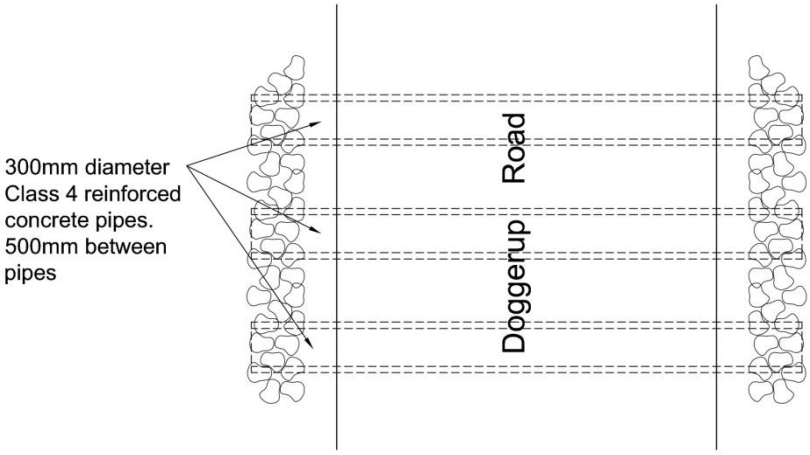
4.2 Second Water Crossing

The second water crossing is located past the edge of the Karri forest and within the sedgeland / reed swamps as can be seen in photographs 12 and 13. The catchment contributing to the crossing appears to be reasonable both on site and upon review of the general aerial contours. The water crossing as shown in photographs 12 and 13 wasn't flowing at the time of the October inspection, however the depth of the crossing was approximately 150mm and there is an existing culvert. The culvert was submerged but is estimated at being around 200mm in diameter. Again, the photographs show the survey stakes that were placed in winter 2010 showing the extent of surface water and/or water flow, however as can be seen the winter area of water is not greatly increased.

The second water crossing also has a small ponded area located directly south of the track crossing point, this is shown as photograph 13. The ponded area appears to be at a slightly higher elevation than the actual channel crossing and it appears to be a previously excavated area. It is not proposed to further disturb this appear as regrowth around the water body has occurred.

It is expected that at least two 300mm diameter pipe culverts would be required to convey the majority of flows for this water crossing, however a detailed catchment design for culvert sizing will be carried out prior to construction being undertaken, using the principles as outlined in Australian Rainfall and Runoff.

The design details of water crossing 2 will be similar to that proposed in water crossing 1; however multiple culverts will be utilised. A plan view is shown here as figure 3, providing detail on the placement of multiple culverts. The use of the multiple culverts will ensure that water flow is not restricted by the development of the track; in addition the culvert size will provide a potential passage for water fauna.



Second Water Crossing Plan View
Not to Scale

4.3 Third and Fourth Water Crossings

The third and fourth water crossings or wetland crossings are the major water crossings for the proposed track construction. The crossings are located at the western edge of the sedgeland/reed swamps and are an extended area of surface water. The surface water flow appears to be in a southerly direction and this agrees with the aerial contours however locally at the crossing due to the flat terrain, water flow should be assumed to travel in both a northerly and southerly direction, particularly in a dry period when surface water may move north into a lower area or shallow localised depressions.

In order to ensure that surface water flow is unaffected by the construction of the track, it is proposed to have this area surveyed, this will enable the low points to be identified and culvert crossings installed to match. The culverts would be installed as per water crossings 1 and 2 however in this case they would be installed with zero grades to ensure water could flow in either direction. Marginal excavation would occur at each of the low points to ensure that the pipework inverts matched the existing ground surface to ensure flow characteristics were maintained after the construction of the track. This is particular required for periods of low surface flow.

Photograph 14, above shows the view looking west from the start of the water crossing / wetland area the edge of the sedgeland vegetation and the pink marking tape line show the approximate location of the track.

In addition to the culverts placed at each low point it is proposed to install additional culverts at regular spacing's across the full width of the wet area, this will ensure that when surface flows occur they minimise the concentration of flows at particular points and ensure that the surface water flows are spread across the whole water crossing in a

similar situation as presently occurs. The use of multiple small culverts is preferred over only a few larger culverts due to this need to maintain a surface flow environment as close as practical to the existing.

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.

4.4 Road Drainage Infrastructure

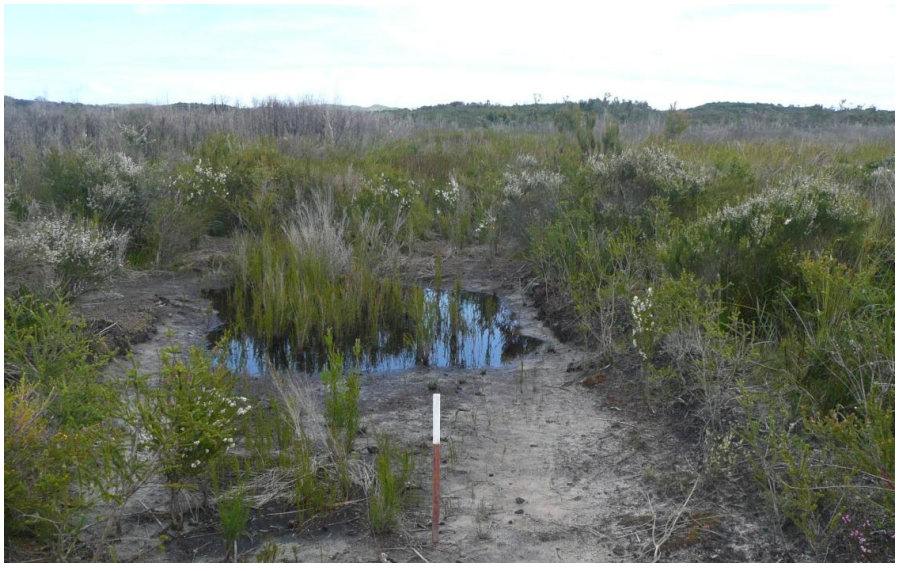
Roadside or swale drains are not proposed for the Doggerup Rd track construction to ensure that rainfall falling on the track is infiltrated at the edge of the track as it would have without the track in place. This is a best management practice of Water Sensitive Urban Design and can be utilised to affect here. The roadside swales would only confine surface water flow and produce concentrated points of discharge at each of the creek crossings. The roadside swales would also create the need for additional, unnecessary clearing.

Off shoot drains are not anticipated to be required for the full length of the track due to the gently undulating slopes. As the road base is placed onto the existing surface and the track graded to a crowned surface or at a crossfall to suit the natural slope of the ground any water flow generated by the track will disperse into the vegetation that will still be in place at the side of the track.

The longitudinal slope of the track does increase as the track comes out of the karri and into the first and second water crossings. There may be occasions when surface water flow out of the existing vegetation builds up against the high side of the track pavement and then runs down the gentle slope against its edge, in these cases it is relatively easy to retrofit several small offshoot drains to prevent erosion of the track base and the transfer of sediment down into the water crossing. This area exiting the Karri was previously partially constructed by the Shire in the 1960's, evidence still exists of where subgrade and roadside drains were pushed up out of the sandy material. These old roadside drains are now heavily overgrown and revegetated, but provide a cut off of any surface water flow onto the track pavement, in addition these areas show no sign of erosion which is why off shoot drains should only be retrofitted if required.

4.5 Areas of Ponding

Photograph 15, shown here is indicative of several small areas only the existing tracks alignment. As previously discussed the day before the October 2010 inspection, it had rained, with several ponding areas as seen here evident. These areas appear to only be present due to previous works on the track alignment, this photograph clearly indicates a small earth bund on the left hand side of the picture, and this small bund could only have been caused by a machine. The depression caused by the machine has since been ponding 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.



These small areas 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.

4.6 Erosion and Sediment Control

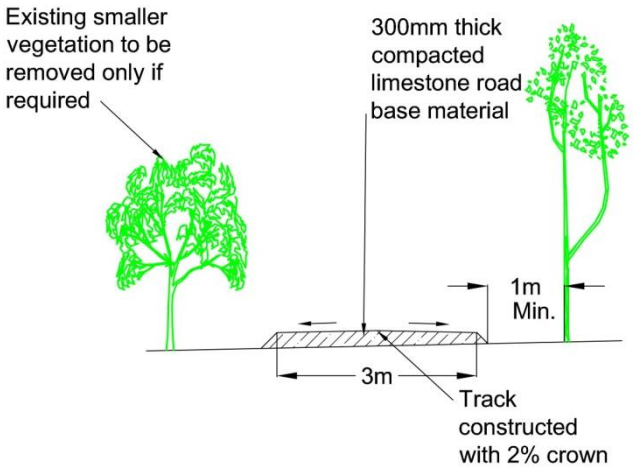
Photograph 16, shows an area of the existing track west of water crossing 2, and shows the slope of the natural surface rising out of the low point of the water crossing. Small areas of scour are clearly visible in the photograph down a line that would approximate the wheel location of a vehicle. This photograph shows two pertinent points, the first is that leaving the track as is will cause significant scour of the sandy surface. This sand will eventually makes its way to the water crossing point and potentially cause a blockage or diversion of the surface water flow plus the covering of the surrounding vegetation. The second point the photograph shows is that earthworking of the existing surface materials should be avoided wherever possible and can be by placing the limestone track base directly onto the existing surface.

5.0 Specific Track Construction Specification

During the inspection of Doggerup Rd several specific areas were noted that would require particular attention to detail to ensure that the track construction will affect the environmental values of the area.

5.1 Habitat Trees

Potential habitat trees were noted at multiple locations along the length of the full length of the track, two examples are shown here in photographs 17 and 18, with a mature jarrah and karri shown in respective photos. 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.

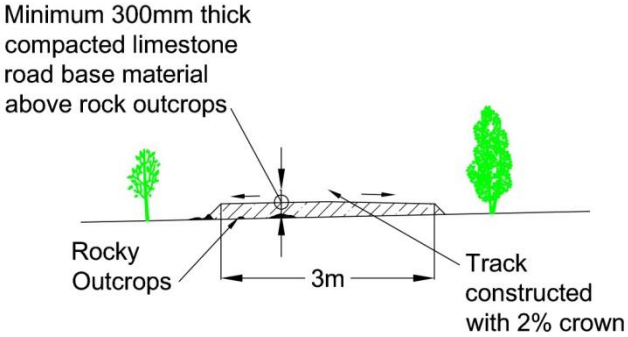


Habitat Tree Cross Section
Not to Scale

Figure 3, provides an engineering sketch showing how the pavement would be located adjacent a potential habitat tree.

5.2 Rocky Outcrops

There exists several points along the track length where rocky granite outcrops occur, as shown here in photograph 19. As shown in Figure 4 below it is proposed to install the limestone track base directly on top of the granite, in order to negate the need to bring in heavy earthmoving machinery, remove the rock and potentially damage areas and vegetation adjacent the rocky outcrops.



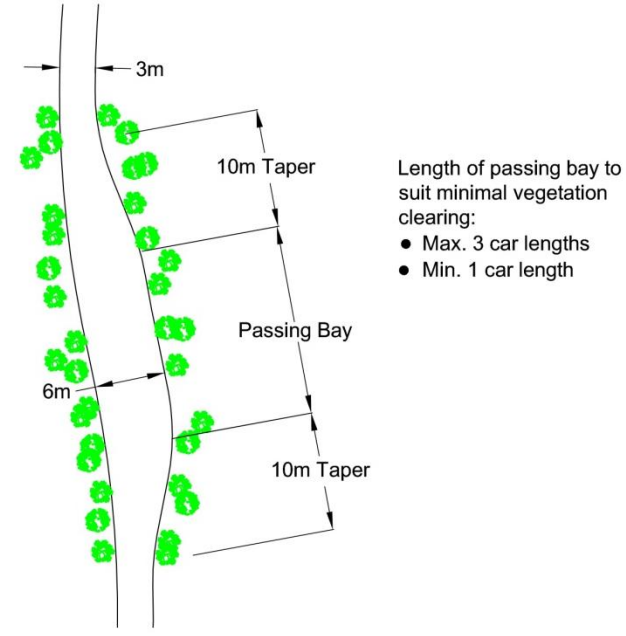
Rocky Outcrop Cross Section
Not to Scale

5.3 Passing Lanes / Areas

Even though the track will essentially be for the sole use of the owners of Loc 7965 and DEC and that every effort will be made to discourage access there is a possibility that other road users may gain access to the track. As the track is only proposed to be 3.0m wide and raised 300mm above the natural surface, several areas where vehicles can pass in opposite directions will be required, therefore passing lanes will be constructed. The inspection indicated several areas where passing lanes could be provided with minimal to no additional vegetation clearing being required.

Photograph 20 shows a potential area where a passing lane could be provided relatively easily. The passing lanes would provide trafficable widths of 6.0m where vehicles could easily pass. Passing areas will be located where previous clearing has been undertaken or where minimal vegetation removal will be required.

Figure 5, below shows an indicative engineering sketch of a passing lane.



Plan View - Passing Lane
Not to Scale

Photograph 21, below shows an area off to the side of the existing track where previous clearing has occurred and limited regrowth has happened, these areas provide ideal areas for passing lanes or widening of the track.

Passing lanes would only be installed at locations as agreed between the Project Engineer, the Shire of Manjimup and the DEC in conjunction with advice from the environmental consultants regarding vegetation removal. The passing lanes will also provide locations for vehicles to undertake a three point turn to exit the track, should they manage to bypass the entry gate.

Areas such as the location shown in photograph 21 would be larger than the area required for a passing lane and would be one of the areas where rehabilitation would occur.

5.4 Access Restriction

Even though the Doggerup Road reserve exists the track is not intended to be an open public road. It is proposed that access will be restricted to the owners, the Shire of Manjimup and the DEC only. The restriction would be placed on the Shire's road registry as being a closed road reserve.

It is proposed that an agreement is made, subject to the approval of the Shire of Manjimup, that the owners of Loc 7965 would maintain the Doggerup Road track this would enable the Shire to close the road to the public.

It is proposed that a gate be installed approximately 10.0 to 20.0m inside the road reserve from Windy Harbour Rd, the gate could be a simple DEC Management gate as shown below in photograph 22 or a solid fire access gate that is used to restrict vehicle access to strategic fire breaks. Either option would involve providing the owners of Loc 7965 with a key or providing a second interlinked lock that the Loc 7965 owners could maintain and use.

5.5 Signage

As previously discussed, although the track is essentially proposed to be a private driveway and DEC access there exists potential for public vehicles to access the road, these vehicles will be unaware of the limited traffic conditions on the track. The conditions on the track should be indicated to these potential vehicles with signage. An example of a proposed sign is shown here as Figure 6, this Narrow winding road sign is a standard Main Roads WA sign. The will reinforce that the track is a low speed environment and will wind around existing vegetation.

5.6 Windy Harbour Intersection

Although not considered as part of the track, there will need to be an intersection of the Doggerup Road track with Windy Harbour Rd. The proposed intersection will be minimal with the proposed limestone base being provided upto the edge of the existing bitumen seal, however the track will not be widened as it meets Windy Harbour Rd to ensure that its visual appearance is minimised to passing traffic.

Photographs 23 and 24, indicate the available sight distances for a vehicle entering Windy Harbour Rd from the Doggerup Rd track, both the north and south sightlines in the respective photos appear adequate to meet the requirements of Austroads design criteria for intersections.

6.0 Construction Methodology

The physical construction of the track has the potential to cause a greater level of disturbance to the existing environment than the use of the track over time, therefore it is proposed to have strict guidelines in place during the construction period.

6.1 Clearing

Clearing of the existing vegetation and fallen debris will only be undertaken to achieve the 3.0m width for the placement of the pavement. There will be no requirement to undertake the removal of large diameter vegetation as these trees will be avoided and determined as potential habitat trees. As is clearly visible in all of the photographs the track partially exists, therefore large scale clearing is not required. It would be intended that the vegetation / trees will be removed by mini excavator and/or small track loader (bobcat) and either placed (as ground stabilisation) on nearby areas currently devoid of ground cover as potential habitat or placed into a small truck and carted to stockpile for other areas devoid of ground cover or alternatively removed from the area completely. Cleared vegetation will not be stockpiled on the site and left to become a potential fire hazard.

Areas devoid of ground cover and vegetation exist due to previous partial road construction clearing by the Shire in the 1960's and will be used as turnaround /lay down areas for construction vehicles during the works and then rehabilitated with plantings and removed vegetation at the completion of the construction works. This will enable the existing road reserve to be left in a better state than the existing. Photograph 25

6.2 Track Construction

As previously discussed it is proposed to place the limestone track base material directly onto the natural surface. The subgrade will not be excavated, proof rolled or have the small organic material removed, thereby preventing any damage to nearby vegetation and root systems. In addition this will negate the need for large scale material removal by larger trucks for the excavated topsoil material. 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. However this method provides the least impact on the surrounding environment.

The limestone will be placed by truck tipping from a suitably sized vehicle and then spread with a small track loader (bobcat) to the finished profile. Works will commence from Loc 7965 and extend to Windy Harbour Rd. Limestone would be tipped and then traversed by the machinery and further limestone deliveries, the machines will therefore perform the compaction.

Drainage culverts would only be installed as the track construction reaches the proposed water crossing location, enabling the pipework to be lifted in place from a partially completed limestone surface, therefore reducing the risk of machines 'bogging' into the natural surface. This will also ensure that machines are not traversing across areas of the existing Doggerup Road reserve, but are driving on the track base.

The proposed pipework would be brought in on a small truck, or utility vehicle only and lifted into place with a small/medium excavator or hiab from small truck. Large construction equipment will not be permitted to be used on the track construction due to the restricted access and lack of vehicle turnaround areas. The proposed concrete pipes are only 2.44m in length and can be transported on smaller vehicles.

6.3 Maintenance

It is proposed that the maintenance of the track will be by the owners of Loc 7965. The level maintenance required to be undertaken is considered to be minimal due mostly to the limited number of vehicles that would traverse the track.

It is envisaged that after the first winter there is likely to be areas where pavement sinkage has occurred due to the non-preparation of the subgrade. These can be repaired by simply filling with additional limestone road base material and wheel compaction with a small machine or even large 4WD. The limestone could again be obtained from Loc 7965. During the first winter the track should be monitored for areas of erosion and the potential retrofitting of off-shoot drains.

A series of guidelines could be established between DEC, the Shire of Manjimup and the owners on the potential issues and potential maintenance solutions, to ensure that DEC are happy with the ongoing upkeep of the track.

Regrading of the road will be required on an ongoing lifetime basis but the period between regrades will be dependent on the traffic volume, as the track is proposed to only be used periodically and only by the owners of Loc 7965 then regrading is unlikely to be required for several years.

7.0 Alternate Track option via Salmon Beach Road

Photograph 26, potential intersection point for track from Salmon Beach Rd

7.1 Engineering Assessment

The construction of a road or track from Salmon Beach Rd could be achieved; the extent of disturbance to the existing environment would be dependent on the road construction criteria. For example, if it was proposed to construct a road of similar standard to Salmon beach road then significant disturbance of would be undertaken. Assessing only the engineering issues with constructing a similar standard track to Option 1 the following issues will need to be considered.

7.2 Clearing

Any dunal system is a fragile environment, the removal of vegetation this close to the coastline provides a significant wind erosion risk. The extent of clearing for a proposed track construction would again be limited to the actual track footprint, where the crossfall and grade of the natural surface permitted. The photographs above clearly show that the terrain associated with a track off Salmon Beach Rd is completely different to the terrain along Doggerup Rd. The additional cross section and longitudinal slope will create additional clearing, even if the track is well located around the steeper areas to minimise clearing. 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.

7.3 Earthworks

The cross section and longitudinal slope of the track will be significant and this will necessitate additional earthworks to prepare the track base. 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. 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, it is likely that roadside drains will be required in several sections in order to convey generated stormwater to low areas; this will necessitate additional clearing width and earthworks.

7.4 Track Construction

If a limestone track base material was also utilised as per Option 1, then this could also be carted from loc 7965 and placed as track construction was undertaken from loc 7965. As a base for the track would have to be prepared as stated in the Earthworks section above, the track construction for this option would be easier.

7.5 Drainage

A track from Salmon Beach Rd will need to consider drainage. The benefit a proposed track will have is the high level of soil permeability, where most of the rainfall on the track will infiltrate adjacent the track. In addition, this option is likely to have limited water crossings. However, the necessity to undertake earthworks to create the track base will create bare sand areas at the edge of the track that will be susceptible to erosion during rainfall. These bare batters will need to be protected after earthworking 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 rock pitched edges. The erosion issue will also occur along the edge of the track or within the roadside drains where the significant slopes will general 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.

Appendix 3

Draft Environmental Management Plan (EMP)
& Correspondence regarding Draft EMP

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

Environmental Management Plan

By:
Kathryn Kinnear
Bio Diverse Solutions
09/05/2012

BIO DIVERSE SOLUTIONS

Contents

Appendices

Appendix A – Draft Construction Plan Mapping

1 Introduction

Bio Diverse Solutions was commissioned by Shellbay Holdings Pty Ltd as Environmental Consultants to prepare an Environmental Management Plan for the construction of an all-weather access track along Doggerup Road, within the Shire of Manjimup. This Environmental Management Plan (EMP) has been compiled to address legislative requirements and align best practise actions to implement the clearing of the road reserve for the development of an all-weather access track in an environmental, social and economically sustainable manner. The EMP aims to meet objectives of the development track and environmental management actions to mitigate any adverse impacts on the natural environment.

The EMP has been documented to address specific Project Actions in the Short term (pre-construction clearing and during construction) and Long term (post construction activities and monitoring). The plan details specific actions, mitigation procedures, responsibilities of the team, training requirements, timeframes for implementation and monitoring.

The Short term environmental actions directly relate to implementation of native vegetation clearing, stormwater and erosion controls, fauna management, fire management, acid sulphate soils management, heritage management, weed management, disease management, noise control, dust control and general site construction activities. Tasks are determined by the level of involvement and responsibilities of the personnel for practical on-the ground implementation. This section of the EMP is designed for smooth and practical implementation to ensure that environmental goals of the construction of the track can be reached.

The Long term actions relate to the post construction stages and the responsibility of the developer/management team post-construction. This period of time is essential to ensure all structures and controls implemented during track construction, continue to work and do not cause any on-going environmental harm. Such issues which arise include stormwater management and water quality, weed management, fire management, access, community involvement, monitoring, access and rehabilitation measures.

For successful implementation of this EMP, an Environmental Officer (Kathryn Kinnear Bio diverse Solutions) who is appropriately trained has been appointed to oversee the environmental management and actions required as contained in this plan.

As the proposed road is not to a current Shire of Manjimup construction standard, and after consultation with the Shire of Manjimup, the Doggerup Road Reserve will be maintained post construction by the Proponent, Shellbay Holdings Pty Ltd.

1.1 Statutory Conditions

This Environmental Management Plan has been prepared for Doggerup Road Reserve to address environmental management issues in the development of the all-weather access track.

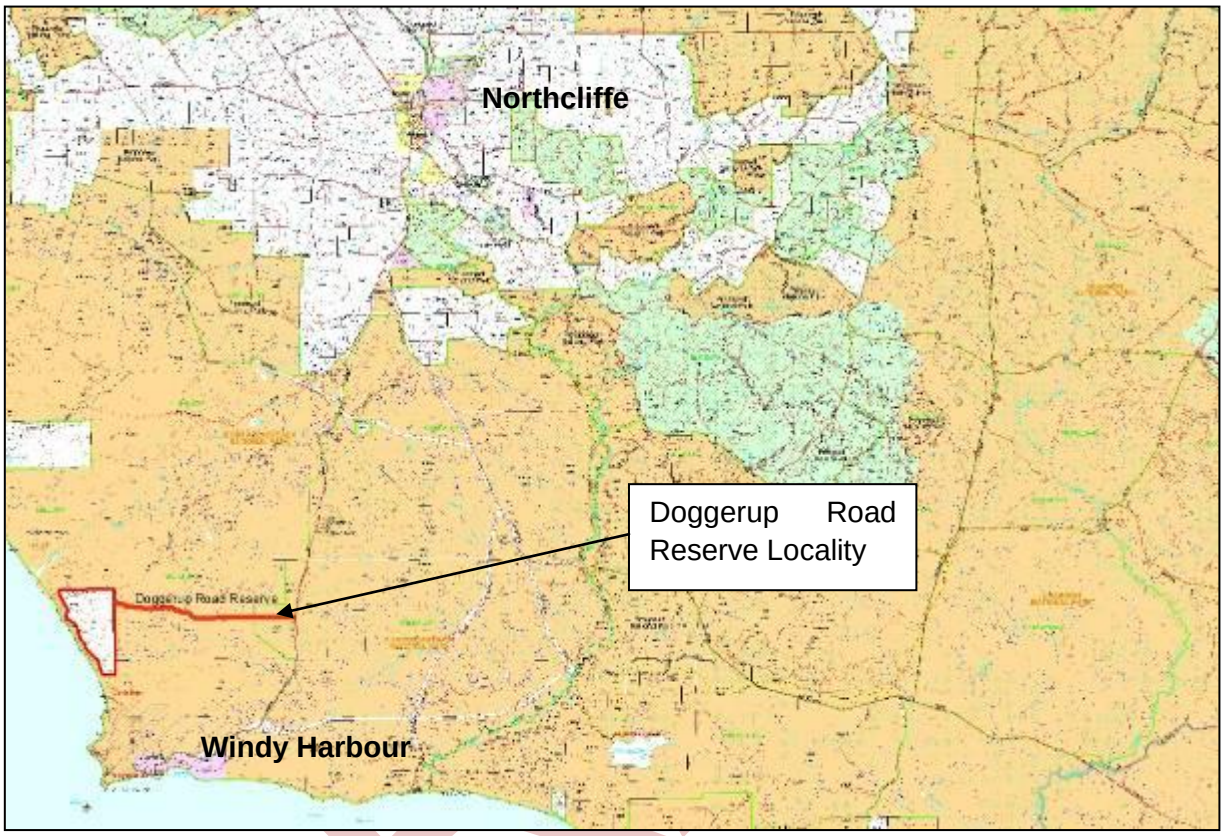
This document and the recommendations contained are aligned to the following policies and guidelines:

- *Wildlife Conservation Act 1950*
- *Environmental Protection and Biodiversity Conservation Act 1999*
- *Environmental Protection (Clearing native vegetation) Regulations; and*
- *Environmental Protection Act 1986*.
- *Conservation and Land Management Act (1980)*
- *Country Areas Water Supply Act (1947)*
- *Health Act (1911) and draft Health Act (2008)*
- *Agriculture and Related Resources Protection Act 1976*

1.2 Subject Site

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. Geographic cartesian coordinates for the Doggerup Road Reserve are E 409155, N 6150335 at the eastern end connecting Windy Harbour Road and E 415343, N 6149774 at the western end bordering Nelson location 7965. Please refer to Figure 1 Project Locality.

Figure 1 – Doggerup Road Location



1.3 The Proposal

1.3.1 General Specifications

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 an all-weather track along Doggerup Road Reserve:

- 3.0m wide compacted limestone roadbase material track.
- Constructed in summer (dry) conditions, designed to create a low speed environment. The track will not be open to the general public in order to restrict the number of vehicles utilising the track.
- Designated a "Controlled Closed Road".
- The track will consist of limestone roadbase material placed on the existing ground surface and compacted to a minimum thickness of 300mm.
- Extent of clearing to a maximum of 10m, excepting creek areas and wetlands, where specific methodology is required;
- The 3.0m width approximates the existing cleared width of the track along several existing sections of the track.
- 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.

- The engineering methodology will aim to minimise earthworks and restrict the area of native vegetation and wetland disturbance.

1.3.2 Project Features

Table 1 – Key Characteristics

Non-spatial elements	***Description***
Legal Description of site	Doggerup Road Reserve
Zoning	Road Reserve
Municipality	Shire of Manjimup
Project life	3 months maximum construction period.
Project timeframe	Completion by June 2012/2013 (depending on approvals)
Vegetation rehabilitation	All disturbed areas.
Gazetted Access	Doggerup Road is the legally gazetted access for Nelson Location 7965.
Limestone Material Source	Walco Lime Supplies, Windy Harbour
Other options considered	**Option 2** – Wheatley Cost Road (DEC managed track) Parliamentary Act required to excise from National Park, approximately 12.76 km track existing, would require 7.6 ha of clearing native vegetation. **Option 3** – Access from Salmon Beach Road Parliamentary Act required to excise from National Park, approximately 4.5 km distance (non existing), would require 9 ha of clearing "Pristine" native vegetation.
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).
Maximum width of track surface construction	3 metres constructed limestone surface (minimum of 300mm thickness).
Turn around/passing bays	In existing cleared areas, no further vegetation clearing required.
Maximum width/area of disturbance	10 metres width of disturbance corridor within the 20 metre Road Reserve, or 6.5 ha (10m x 6.5km).
Clearing native vegetation ha (maximum)	Not more than 6.5ha along road within a 10m maximum disturbance boundary/corridor (within 20m Road Reserve).
Maximum width and area of permanent clearing	6 metres within 10m corridor, 3.9 ha. (3m running surface, 4m batters).
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).
Spatial elements	***Description***
Construction material	Crushed limestone compacted to min of 300mm
Threatened Ecological Communities	None to be disturbed
Priority Flora	Not more than 30 Priority 3 - *Hemiandra Australia* Not more than 6 Priority 2 *Andersonia barbata* Not more than 1 Priority 4 *Astartea sp. Scott River* Not more than 24 Priority 3 *Goodenia filiformis* Not more than 5 Priority 5 *Gonocarpus pusilis* Not more than 20 Priority 3 *Stylidium leewinense*
Wetlands	Gardiner Watershed, 1700m^2 of creek crossings (4 sites)

1.3.3 Track Specification

The proposal for the track access on Doggerup Road is to minimise the environmental impact by providing (essentially) a private access driveway for Location 7965. The construction will be to the minimum requirements to protect the maximum area of vegetation and natural environment within the existing public road reserve.

1.3.4 Construction methodology

The track would be constructed on top of the existing surface with minimal clearing 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, whereby culverts have been constructed to allow for water flow through the landscape. Summertime track is subject to seasonal closures by DEC (winter closure due to inundation).

Please refer to Photograph 1 and 2 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.

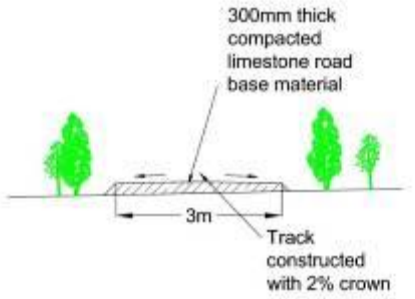
The roadbase material is placed on top of the existing ground surface without the formation of defined roadside drains. Wetland/water crossings are formal water crossing (culverts and pipes) and are located beneath the guide posts in the photograph.

Another similar constructed track is the D'Entrecasteaux Road within the Windy Harbour Townsite. This is a 3.0m wide all weather limestone track with the vegetation regrowth occurring right up to and even 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 elevated above natural surface level by the actual track pavement. Please refer to Photograph 2 below.

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

The track is proposed to be constructed in the same manner as the above two local tracks, with the slightly undulating land and minimal crossfall, earthworks will be kept to a minimum, with previously disturbed areas utilised (i.e. for turnaround areas). The footprint for development shall be within the Doggerup Road Reserve with the limestone roadbase placed directly onto the natural surface. The only area of disturbance will therefore be generally minimised to directly beneath the actual track.

The marginal cross fall of the existing surface will be accommodated by permitting the limestone roadbase material to be marginally thicker on one side of the track compared to the other or having the proposed track finished surface crossfall match the crossfall of the natural surface. The general track design cross section is shown right in Figure 1. Engineering assessment and design shall confirm the track specification, with specific guidance at creek/wetland crossings.



General Track Cross Section
Not to Scale
Figure 1

For further construction methodologies (especially at wetlands and creekli refer to the MPM Development Consultants Engineering Report (Pippin, C 2010).

2 Background to Project

The project is presently being assessed by Environmental Protection Authority (EPA) this report forms part of the Public Environmental Review Process. As part of the assessment phases an Environmental Management Plan is required to guide the development of the all-weather access track and has been prepared in consultation with the Shire of Manjimup (SoM) and the Department of Environment and Conservation (DEC).

Parallel to this and as part of the development process, the EPA require an Environmental Management Plan to be prepared to submit to various Government Agencies as part of the development approvals and submitted to the Environmental Protection Agency (EPA) for Environmental Impact Assessment during the Public Environmental Review Process.

2.1 Native Title and Aboriginal Heritage

The subject site is located within the Native title claim of the South West Boojarah 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”.

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. These include:

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

Heritage consultation and site survey was undertaken on February 3rd 2011 by a Department of Indigenous Affairs (DIA) recommended (Pers Comms Robert Reynolds Jan 2011) heritage

consultant Wayne Webb. The Doggerup Road Reserve was walked by Wayne Webb with the result being the site was not deemed of aboriginal heritage value.

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.

2.2 Land use and Tenure

The subject site, Doggerup Road, is Road Reserve and 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, 1960).

The road access to 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 (east end of subject site).

Doggerup Road is the formal gazetted access to Nelson Location 7965 Sandy Peak. Sandy Peak (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 their property.

Surrounding the Doggerup Road Reserve is D'Entrecasteaux National Park. The National Park adjacent to the subject site (Doggerup Road Reserve) was gazetted in 28 November 1980 and is 116, 686 ha in size, managed by the Department of Environment and Conservation and Land Management (DEC) from the regional office at Manjimup and through district work centres at Pemberton and Northcliffe. The Department manages these areas on behalf of the Conservation Commission of Western Australia.

D'Entrecasteaux National Park Comprises of two Class A reserves (no. 36996 and 43961) vested with the Conservation Commission and set aside for the purpose of 'national park and water'.

2.3 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 of a concern to the DEC due to spread of Dieback (*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).

The *Draft Shannon D'Entrecasteaux National Park Management Plan* (CALM 2005) outlines that Nelson location 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. (CALM 2005)

The 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 the biggest tourist and recreational site 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. Please refer to photographs 3 and 4 over the page.

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

Photograph 4 – 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)

2.4 Relationship to other plans and reports

This EMP report has been prepared to address environmental considerations associated with the development of an all-weather access track along Doggerup Road Reserve, in the locality of Windy Harbour, Shire of Manjimup.

This EMP should be read in conjunction with the following plans/reports prepared as part of this project:

- *Environmental Scoping Document* (ESD), Bio Diverse Solutions Version 9 dated 28/9/2011
- *Doggerup Road Reserve Flora Survey,* Natural Area Consulting August 2011
- *Wetland Assessment Doggerup Road Reserve*, Natural Area Consulting March 2011
- *Phytophthora cinnamomi (P.c.) Doggerup Access Track, Malimup Block,* Moore mapping April 2011
- *Preliminary Fauna Report,* Bio Diverse Solutions September 2011
- *Acid Sulfate Soil Investigation,* Bio Diverse Solutions April 2011 and DEC approval letter dated 21st September 2011 (DEC, 2011)
- *Heritage Assessment*, Wayne Webb 2011

Components of this EMP make specific referral to these documents and recommendations from these reports combined into the EMP, it is therefore recommended that these documents are referred to during the implementation of this EMP.

2.5 Consultation and Revision of EMP

This EMP has been compiled in consultation with the following organisations:

- MPM Development Consultants – Craig Pippin
- Shire of Manjimup – reviewed and recommendations included in draft
- DEC Southern Forests Region Manjimup – Declined to review

Updated revisions of this EMP will occur throughout the life of this project to combine feedback from consulted organisations as received. Any changes or modifications to technique of track construction or long term management changes, will require this report to be updated. Please refer to the Revision Record Section 14 of this document for current status of this report.

3 Objectives

The Environmental Management Plan (EMP) highlights all the environmental management actions required throughout the construction of the limestone track in Doggerup Road Reserve. The activities are aligned to pre-construction, during and post construction activities and have specific references where required to other detailed management plans or documents.

The plan makes specific construction actions for Shellbay Holdings Pty Ltd to align duties to the Construction Project Manager, Environmental Officer, Site Supervisor and Machine Operators. The plan also documents the long term maintenance and performance indicators for site's environmental management post construction.

The objectives of this EMP are to:

- Align activities to concerns as outlined by the DEC and EPA;
- Document techniques to manage the construction of the site to meet Ecologically Sustainable Targets pre, during and post construction;
- Implement environmental indicators to monitor outcomes from the development process;
- Identify roles and obligations of stakeholders and responsibilities;
- Identify training and briefing requirements;
- Ensure that the clearing and bulk earthworks are done in accordance with detailed designs, best practise and sustainable measures;
- Align to environmental statutory requirements;
- Ensure that works are done while minimising environmental degradation;
- Ensure that all site personnel comply with the terms and conditions of the EMP;
- Respond to changes in environmental conditions during construction through monitoring and consultation; and
- Ensure mitigation measures are completed in an appropriate manner;
- Ensure all activities are aligned to current best practise, Legislation and Guidelines; and
- Document management procedures for the site post construction practical completion.

This document shall be reviewed and updated as the project evolves with a revision record as set out in Section 14 of this document.

3.1 Risk Statement

Environmental Risks associated with the proposed works identified through the planning and consultation includes:

- Degradation to soil and adjacent vegetation from clearing native vegetation;
- Maintaining Water Quality - Stormwater management, specifically ensuring treatment of water prior to entering receiving water courses;
- Sedimentation or erosion from construction works activities;
- Pollutants into the environment from site work activities;
- Topsoil displacement and the creation of dust;
- Fauna death and displacement;
- Nuisance (noise) to residents in adjoining properties;
- Exposing Acid Sulphate Soils; and
- Spread of weeds and pathogens into the site and off-site and associated impacts.

3.2 Control measures

Shellbay Holdings Pty Ltd will instigate primary control measures for the above stated risks during construction by:

- Appointing an Environmental Officer to oversee the implementation of the EMP (completed);
- Appointment of a Civil Engineer as Project Manager to oversee all engineering construction specifications (completed);
- Minimising vegetation clearing, disturbance and topsoil movement;
- Put in place erosion and sedimentation barriers before any works start;
- Cover all bare soil as soon as possible with topsoil to encourage regeneration of cleared areas;

- Control dust and noise by wetting road surface regularly with water truck;
- Control construction works between 0700hrs and 1800hrs;
- Control movement of weeds and pathogens incoming and outgoing of site; and
- Initiating long term monitoring and maintenance schedules/plans.

4 Environmental Objectives and Controls

As part of the construction of the access track in Doggerup Road Reserve, Shellbay Pty Ltd propose to undertake site works to the following objectives with control measures:

1. Preserve Fauna Habitat where practical by retaining all habitat trees identified in the Preliminary Fauna Report (Kinnear, K 2011);
2. Preserve Fauna Habitat and site amenity - Identify, flag the GPS habitat trees (>250mm diameter and 500mm in Karri trees) for retaining along the road reserve.
3. Preserve Vegetation and utilise a minimal footprint;
4. Appointment of Environmental Officer for the Project to implement environmental strategies as outlined in this EMP. Advice from the Environmental Officer shall feed into all stages of development.
5. Appointment of a Civil Engineer (Project Manager) to oversee site works, ensure construction methodology is conformed to, and undertake operational briefings to machine operators.
6. Undertake Stakeholder liaison to ensure all environmental objectives are met during the project. This will be undertaken by the Project Manager and Environmental officer as required and will include but not be limited to the following agencies:
    i. Department of Environment and Conservation (DEC) – Flora & Fauna
    ii. Department of Water (DoW) – Storm water management
    iii. Shire of Manjimup – Landowner, approvals and maintenance
    iv. Local community groups and interest groups

4.1 Construction Methodology

The physical construction of the track has the potential to cause a greater level of disturbance to the existing environment than the use of the track over time, therefore it is proposed to have strict guidelines in place during the construction period.

4.2 Clearing

Clearing of the existing vegetation and fallen debris will only be undertaken to a maximum of 10m (exempting wetlands and creeek areas) to achieve the 3.0m width for the placement of the limetsone material. There will be no requirement to undertake the removal of large diameter vegetation as these trees will be avoided and retained as potential habitat trees.

As is clearly visible in all of the photographs (ESD and PER reprots, K.Kinnear 2011), the track partially exists, therefore large scale clearing is not required. It would be intended that the vegetation/trees will be removed by mini excavator and/or small track loader (bobcat) and either placed (as ground stabilisation) on nearby areas currently devoid of ground cover as potential habitat or placed into a small truck and carted to stockpile for other areas devoid of ground cover or alternatively removed from the area completely.

Cleared vegetation will not be stockpiled on the site and left to become a potential fire hazard. Areas devoid of ground cover and vegetation exist due to previous partial road construction clearing by the Shire in the 1960's and will be used as turnaround /lay down areas for construction vehicles during the works and then rehabilitated with adjacent topsoil and removed vegetation at the completion of the construction works. This will enable the existing road reserve to be left in a better state than the existing.

Construction methodology over wetlands and sensitive areas will be as per the design recommendations from MPM Development Consultants (Pippin, C 2010). This report will be used to guide all construction activities and methodology and should be read in conjunction with this plan.

5 Project Actions

The project actions for this EMP have been divided into Short term actions (pre-construction and construction), Long term actions (maintenance and monitoring) and post construction activities.

5.1 Short Term Actions

Prior to commencement of construction of the site works, it is recommended that the following people are appointed and briefed of this document:

- Construction Project Manager/Civil Engineer (C.Pippin MPM Development Consultants) – To have overall responsibility for implementation of control measures and ensuring that actions are carried out by all personnel on site.

- Environmental Officer (K.Kinnear Bio Diverse Solutions) – To give direction and guidance as required during the implementation of this EMP. The Environmental Officer shall also give guidance during the planning and design phases to ensure Environmental actions are implemented throughout the project.

- Site Supervisor (B.Owens Shellbay Holdings Pty Ltd) – Delegated responsibilities from the Construction Project Manager, ensures all day to day activities and control measures are being implemented on site.

- Machine Operators – Specific requirements/methodologies documented in this plan to ensure environmental compliance.

The following sections document the activities and their associated environmental risks with the construction of this subdivision:

- Pre-construction Stage Activities – Project Coordination, Site inspections, Disease Management and clearing the site.
- Construction Stage Activities – All construction activities, Disease Management, Fire Management, and Site cleanup.
- Post Construction Stage Activities – Site inspections and monitoring.

Activities are listed under each stage and the Harm or Risk outlined. Assigned actions will be undertaken by appointed people. This program shall be adhered to by Shellbay Holdings Pty Ltd with a commitment given by the proponent through the provision of this report.

A detailed Construction Map is provided in Appendix A. The locations of passing lanes, turnaround areas and hygiene clean down areas in the Mapping (Appendix A) are subject to further consultation and site verification.

5.1.1 Pre-construction Stage

Activity: Project Coordination

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
Waste generation, water, noise air and pollution.	Best Practice to minimise environmental impacts & ensure efficient management.	***Project Manager:*** Coordinate inspections with operators working on site regarding site management, timing of works and waste management. Plan the site, access, clean down areas, waste, and topsoil stockpiling.
Neighbour complaints	Notify of impending construction works.	***Project Manager:*** Liaise with Neighbours of pending works.
Reduce environmental harm	Briefing of construction stages	***Environmental Officer:*** Ensure all construction team are identified, and personnel are briefed of EMP. Prepare detailed map of track constuction location of turnarounds, water points, hygiene requirements etc (from Shire and DEC walk over) and disseminate to Site Supervisor and Project Manager prior to commencement.
Spread of weeds	Ensure weeds are not spread into adjacent areas	***Project Manager:*** Ensure machine operators are aware of weeds during clearing operations. ***Environmental Officer:*** Ensure all infestations are identified, flagged and personnel are briefed. As per weed Management Plan.
Threatened Flora	Reduce impact, avoid	***Environmental Officer:*** Ensure Threatened Flora are identified, flagged and personnel are briefed.

Activity: Site Inspection cont

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
Spread of weeds cont		***Machine Operators:*** Clean down machines prior to entry to site to ensure no further infestations are brought on site. Ensure weeds disposed to green waste off site. As per Weed Management Plan. ***Site Supervisor:*** Ensure all personnel briefed of weeds and do not move weeds off site during construction Weeds to be treated or disposed to green and not re-used for topsoil re-application.
Soil erosion	Minimise soil erosion, no materials to wash or blow from the site.	***Project Manager:*** Undertake drive/walk over and identify any areas that may need erosion and sediment control. Instigate soil erosion sediment traps or control measures. ***Site Supervisor:*** Check erosion and sediment controls are installed and communicated to site workers. ***Environmental Officer:*** Undertake Site walk over, idenitfy any areas susceptible to erosion, discuss methods to reduce effects with supervisor.

Activity: Disease Management

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
Spread of disease	Minimise spread of disease & pathogens No wet soil movement policy	***Project Manager*:** Ensure all personnel are briefed on clean down of machine prior to commencement of works and if moving off site during works to prevent spread of pathogens between sites. ***Machine Operators:*** Clean down machines prior to entry to site to ensure no further infestations are brought on site. ***Environmental Officer*:** Ensure all personnel are are briefed on Dieback Management Plan (Section 7). Ensure all soil testing is under taken of limestone material and certified disease free prior to commencement. Ensure all demarcation tapes are fully visible and hygiene signage in place prior to commencement of works. Ensure all operators are briefed on clean down of machine prior to commencement of works and if moving off site during works to prevent spread of pathogens between sites. Ensure walk over of site undertaken prior to comencement of construction with Project Manager and Site Supervisor.

Activity: Disease Management cont

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
Spread of disease cont	Minimise spread of Disease & pathogens Soil wet soil movement policy	***Site Supervisor:*** Ensure all operators are No briefed on clean down of machine prior to commencement of works, and when moving off site during works to prevent spread of pathogens between sites. Ensure all site personnel are briefed on hygiene demarcation areas. Ensure brushdown procedures are in place prior prior to entry to site.

Activity: Habitat Management

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
Protection of Fauna Habitat	Ensure fauna habitat preserved	***Project Manager*:** Ensure all personnel are briefed on clearing exclusion areas prior commencement of works . ***Machine Operators:*** Ensure trees which are flagged are retained. ***Environmental Officer:*** Ensure walk over of site undertaken prior to comencement with development exclusion areas and habitat trees clearly marked/defined.

Activity: Clearing the site

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
Soil erosion	Minimise soil erosion	***Machine Operators:*** Remove vegetation as per engineering specification. ***Project Manager:*** Disturbance to be minimised and ensure erosion and sediment control measures are employed.Clearing is confined to necessary areas.

Activity: Clearing the site cont.

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
		Site Supervisor: Check daily and after rain any exposed soil is contained within the erosion and sediment controls.
Wastage of useable topsoil	Minimise the need to aquire topsoil from other areas for rehabilitation (batters)	***Machine Operators:*** Strip topsoil as required store adjacent to track in stockpiles no more than 0.5 metres high, if required place in designated areas.
Spread of weeds	Minimise the spread of weeds.	***Site Workers***: Weeds to be disposed to green waste or treated as per weed management plan.
Spread of weeds cont.		***Machine Operators:*** Ensure all machines are clean of debris prior to commencement of work and if moving offsite, are cleaned down to minimise spread of declared and noxious weeds.
Misuse or spill of hazardous materials	All pesticides, fuels and other hazardous materials are to be used and stored correctly	***Site Supervisor:*** Ensure trained people are utilising hazardous materials. Explain spill containment and clean-up procedures to all site workers. See Section 5.7.
	No storage of hazardous materials on site	***Site Supervisor:*** Ensure that all machines are re-fuelled from mobile tankers. Ensure any refuelling activities are carried out in the designated refuelling area (adjacent to Windy harbour Road).
	Spill containment	***Site Supervisor:*** Ensure containment and procedures are carried out as per Section 5.7 of this document.

5.1.2 Construction Stage

Activity: All construction activites

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
Soil erosion Check	Minimise soil erosion.	***Site Supervisor:*** Check daily and after rain any exposed soil is contained within the erosion and sediment controls.
Noise Pollution	Minimise noise to adjacent properties.	***Site Supervisor:*** Ensure machine operations are carried out between 0700 and 1800hrs, adjacent to private properties.
Dust to adjacent areas	Minimise dust onto adjacent properties.	***Site Supervisor*:** Ensure water trucks/ light tankers used to control dust. Avoid working in periods of high/ extreme winds.
Misuse or spill of Chemicals	All pesticides, fuels and other hazardous materials to be used and stored away from site	***Site Supervisor***: Ensure that only trained workers use hazardous materials. Ensure that hydrocarbons (fuels, oils) are not stored on site. Explain spill containment and clean-up procedures to all workers as per Section 5.7.
Re-fuelling machinery / vehicles	Ensure spills are contained	***Site Supervisor*:** If re-fueling required on site, ensure does not occur on or adjcent to creeks/wetlands. In desingated area at Windy Harbour Road Ensure waste management occurs no spent oil cartridges left on site.

Activity: Disease Management

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
Spread of disease	Minimise spread of disease & pathogens	***Project Manager*:** Ensure all personnel are briefed on clean down of machine prior to commencement of works and if moving off site during works to prevent spread of pathogens between sites. ***Site supervisor:*** Ensure all demarcation flags, signs and washdown areas are in place through daily inspections. Ensure all incoming personnel aware of vehicle and foot wear hygiene requirement's. Ensure site gated and locked daily to prevent illegal access during Construction periods.

Activity: Fire Management

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
Ignition of wildfire	Minimise risk of ignition	***Site supervisor:*** Days which are "Extreme" Fire Danger Index (FDI), all machinery operation to cease to ensure there is no risk of wildfire ignition. A fire tender vehicle be located on site at all times during site works. ***Project Manager:*** Maintain constant communication with DEC Pemberton Duty Officer regarding foreseen fire weather and extreme FDI days. ***Machine Operator:*** Ensure any vegetative matter is respread immediately or removed and not stockpiled for any length of time.

Activity: Site Clean-up

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
Pollution into the environment	No waste or pollution to be left on site	***Site Supervisor:*** Site inspection along the route daily and at competion of works to ensure no waste material is left behind.

5.1.3 Post Construction Stage

Activity: Site inspections

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
6 monthly inspection Site	Ensure that no weeds have come into road side reserves and that rehabilitation has been successful.	***Environmental Officer:*** inspection to assess rehabilitation and weeds have not invaded. Check status of rehabilitation, planting from local seed stock (endemic species only) as necessary.
	Maintain water flows in wetlands & creeks	***Project Manager:*** Inspect all stormwater structures, culverts, pipes etc. to ensure water flows are not obstructed and working as per engineering specification.
12 month inspection	Ensure that no weeds have come into road side reserves and that rehabilitation has been successful.	***Environmental Officer:*** Site inspection to assess rehabilitation and weeds have not invaded. Check status of rehabilitation, planting from local seed stock as necessary.
	Maintain water flows in wetlands & creeks	***Project Manager:*** Inspect all stormwater structures, culverts, pipes etc. to ensure water flows are not obstructed and working as per engineering specification. Undertake site walk over with Shire of Manjimup and Shellbay Holdngs Pty Ltd regarding any ongoing track management requriements. Long term responsibility will be the owners of Nelson Location 7965.

Activity: Site inspections cont

Environmental Risk or Issue	*Objective or requirement*	*Control measure*
18 month inspection	Ensure that no weeds have come into road side reserves and that rehabilitation has been successful.	***Environmental Officer:*** Site inspection to assess rehabilitation and weeds have not invaded. Check status of rehabilitation, planting from local seed stock as necessary.
	Ensure all drainage is working to design standards.	***Environmental Officer:*** Undertake inspections post rainfall events and periodically post construction for a period of 18 months.
		Undertake site walk over with Shire of Manjimup regarding any ongoing track management requriements.
		Long term responsibility will be the owners of Nelson Location 7965.

5.2 Environmental Training Requirements

Environmental training for all site construction workers includes:

- A site induction
- Familiarisation with site environmental controls
- Disease management

Title & signature	*Training required*	*Trainer*	*Verification/date*
All work crews	Site induction	Site Supervisor	
Site Supervisor and works crews	Familiarisation with EMP & standards.	Environmental Officer	
All works Crews	Disease management	Environmental Officer	

5.3 Monitoring and Contingency Planning

Environmental controls during construction will be checked at frequent intervals as outlined in Table 2 below. This will be the responsibility of the Site Supervisor and the Environmental Officer to ensure all the below activities are carried out.

Table 2: Environmental Monitoring Activities During Construction

Frequency	*Activity*
Daily	Check all sediment controls
	Check waste materials collected from site are correctly sorted and stored (i.e. green waste, refuelling in designated areas only)
	Check personal safety equipment before each use
	Check dust filters on equipment
	Visually check vehicles and equipment for leaks or potential oil spills
	Check signage, gates and demarcation tapes (trees and dieback) in place
	Check noise suppression devices on equipment prior to working
Twice weekly	Check containers of hazardous materials are properly stored and not damaged (away from site)
	Ensure dust suppression controls in place
Weekly	Visually check vehicles and equipment for leaks or potential oil spills
After rain	Inspect all sediment control structures
	Check all drains are free from debris or chemicals (i.e. hydrocarbons)
	Stormwater structures are checked and/or are cleaned out
	Check for erosion after wet periods and winter months
	Ensure drainage structures are working as per Engineering specification
Monthly	Ensure sediment controls are working appropriately
	Ensure revegetation areas are healthy and free of weeds
	Apply brush from adjacent vegetation on any bare areas
	Remove weeds as per Weed Management Plan
	Ensure public access is restricted and signage in place

5.4 Control of Environmental Incidents

An important aspect in the environmental program is management of non-conformance or incidents. An environmental incident is an event which could result in pollution to the local environment. The

planning of site works and methodology as outlined within this management plan limits the risk and harm of construction works impacting on-site or off-site.

If an incident or event occurs during construction, it should be emphasised to all personnel working on site that all incidents are documented. Investigations should be conducted and action plans established in order to ensure the event does not happen again.

5.5 Corrective and Preventative actions

An Environmental Investigation should include the following basic elements:

- Identify the cause of the incident;
- Identifying and implementing the necessary corrective action;
- Identifying the personnel responsible for carrying out corrective action;
- Implementing or modifying controls necessary to avoid repetition; and
- Recording changes in written procedures required.

5.6 Contingency Procedures

Contingency measures are included within this management plan. These protocols are designed to reduce adverse environmental impacts and provide an early detection of non-conformance and subsequent corrective action. Any modifications to the outlined strategies and methodologies to meet unexpected conditions shall be agreed to by the Environmental Officer. Monitoring shall be used to confirm the effectiveness of any changes.

Should it be identified by any personnel involved in the project there is a non-conformance to the acceptable methodology or there is reason to cause environmental harm, in consultation with the Site Manager and Project Manager, activities should cease during resolution of the required change in methodology.

The Environmental Officer should be notified of any environmental non-conformances and undertake site investigation.

5.7 Spill Management Procedures

The following information is from the DEC Spill Management Brochure (DEC 2011). This should be the methodology employed should a spill from fuel or chemical occur.

Dealing with minor spills

A small spill is considered to be a spill of 5 litres or less providing the product is not concentrated. For concentrated products of any quantity the spill must be treated as a large spill.

1. Assess safety. Make sure that people are kept clear, and that you have the right training and equipment to deal with the spill.
2. Stop the source. Providing it is safe to do so, stop the spill at its source. This may involve righting an overturned container or sealing holes or cracks in containers.
3. Contain and clean up the spill. The spill should be mopped up immediately.
4. Record the spill. Record when, what, how and where the spill occurred, clean up measures undertaken and the names of any witnesses. Also make note of what changes can be made when handling, transporting or storing chemicals to ensure a similar incident does not happen again.

Dealing with large spills

A large spill is considered to be anything over 5 litres or concentrated chemicals of any volume.

1. Assess safety. Make sure that people are kept clear, and that you have the right training and equipment to deal with the spill.
2. Consult the Material Safety Data Sheet (MSDS). The MSDS will have instructions on how to deal with specific chemical spills.

3. Put on protective clothing. If necessary, put on gloves and goggles, a mask and an apron.
4. Stop the source. Providing it is safe to do so, stop the spill at its source. This may involve righting an overturned container or sealing holes or cracks in containers.
5. Contain and control the flow. The spill should be prevented from filtrating into the ground or entering the stormwater system. The outer edge of the spill should be dammed with rags, blankets, sand, sands bags, mops and/or absorbent booms.
6. Clean up the spill. Promptly cover the spill using absorbent materials such as the correct absorbent granules for the product (Note that some strong acids will react with some types of granules and sawdust), sand and rags, being mindful not to splash the spill. Using a dustpan or spade, the absorbent granules or sand must then be scooped up and placed into a container. This waste material is not to be buried or thrown into the environment. The method of disposing this waste will depend on the amount and the type of chemical that was spilt. The Department of Environment Controlled Waste Section will advise on the appropriate disposal of hazardous substances. There are several contractors that will dispose of contaminated substances and soils. All contact phone numbers can be found below
7. Notify the appropriate authority. If the spill does enter a stormwater drain or open ground, the Department of Environment and your local council must be notified. Please refer to the phone numbers listed below. If there is a hazard to health or property, call Fire and Rescue on 000 immediately.
8. Record the incident. Record what, how and where the spill occurred and the names of any witnesses. Also make note of what changes can be made when handling, transporting or storing chemicals to ensure a similar incident does not happen again.

Who to call in an emergency

All hours phone numbers

Life / property emergencies: Ambulance, Fire or Police	000
Pollution emergencies - Department of Environment	1800 018 800
Poisons Information Centre	13 11 26
Water Corporation – Emergencies and water service difficulties	13 13 75

Business hours phone numbers

Fire and Emergency Services Authority	9323 9300
Department of Environment	9222 7123
Department of Mineral and Petroleum Resources – Explosive and Dangerous Goods	9222 3333

6 Long-term Actions

The Shellbay Holdings Pty Ltd are responsible for the site maintenance during the construction period and the long term maintenance of the road post construction. The Shire of Manjimup are listed as a Stakeholder for consultation purposes only. The Proponent gives a commitment to undertake the following through the endorsement of this plan. The Environmental objectives to be maintained and monitored post construction are outlined below, please refer to Table 3 below.

Table 3 – Long Term Management

Management Objective(s)	*Management Aims*	*Management Action(s)*	*Stakeholders*	*Performance Indicator*	*Indicator Measurements*	*Monitoring frequency*
Weed Management	Reduce the impact and spread of weeds .	Remove all weeds through actions including: Hand/mechanical removal; and Spot spraying of individual plants.	Shire of Manjimup Shellbay Holdings Pty Ltd. Bio Diverse Solutions	Weed populations identified on site	The recurrence of weed populations is minimal; and New populations of weeds do not occur.	Implement weed monitoring 6, 12 and 18 monthly program. As per Weed Management Plan.
Water quality, water flows and Stormwater Management	Maintain adjacent creek /wetland water quality parameters; Ensure stormwater flows from the track construction do not impact natural environment; Ensure water flows are not interrupted as per predevelopment flows; and Ensure all stormwater controls are maintained in correct working function.	Ensure water quality controls and structures are in place and in correct working order; and Inspections of stormwater structures every 6 months or after heavy rainfall events.	Shire of Manjimup Shellbay Holdings Pty Ltd. Bio Diverse Solutions	Hydrological function maintained, no obstruction or pooling of water as per construction flows. Drains, creeks and wetlands water quality/condition (appearance), vegetation condition and flow condition.	No unusual vegetation deaths, sludge or scum forming in and around the drains and pipes. Water appears to be clean and clear; carrying only suspended natural vegetation from natural stream or drainage lines and not carrying any scum or foreign material.	6 monthly monitoring of all stormwater structures and/or after heavy rainfall events (>1:100 ARI)
Rehabilitation of degraded areas from any track construction activities.	Rehabilitate degraded areas from construction activities such batters or drains or clearing of native vegetation areas.	Revegetate degraded areas with preserved topsoil; Remove invasive weed species to prevent any vegetation structure decline; Prevent erosion through established vegetation and/or erosion control methods; and Collect adjacent seed in spring or flowering periods and spread in following autumn/winter periods to “bulk out” revegetation areas if required.	Shire of Manjimup Shellbay Holdings Pty Ltd. Bio Diverse Solutions	The area (m^2) of degraded vegetation (percent weed establishment); Poor native vegetation condition of degraded areas; and Erosion does not occur after heavy rains or high winds during dry periods.	The area (m^2) of degraded vegetation (weeds) has been reduced and continues to reduce in area; Native vegetation continues to grow without assistance; Deaths in native vegetation natural; and Erosion is minimal during high rainfall months or during dry periods with high winds.	6 monthly monitoring of rehabilitation areas, as per Rehabilitation Plan.
Public Access and Restricting access to sensitive areas ***(National Park)***	Public Access is restricted and access to sensitive areas restricted. Illegal entry is sign posted.	Local traffic only, signage installed and checked regularly; Gated and signed “Controlled Closed Road” at access point from Windy harbour Road; and Ensure signage visible and gates closed and not damaged.	Shire of Manjimup Shellbay Holdings Pty Ltd	Access is via Doggerup Road for owners and visitors to Nelson Location 7965. Illegal entry is reported to the local Police	Regular patrols monitoring vehicles around the site; and New signs of unlawful access.	Quarterly and informal checks.
Generate and maintain Community involvement	To be informative to neighbours regarding the construction of the track; and ongoing environmental management.	Ensure neighbours are notified of the milestones of the construction period; and Notify neighbours of any maintenance works.	Shire of Manjimup Shellbay Holdings Pty Ltd.	Complaints from adjacent residents.	Amount of complaints post construction activities.	Quarterly and informal checks.

Management Objective(s)	*Management Aims*	*Management Action(s)*	*Stakeholders*	*Performance Indicator*	*Indicator Measurements*	*Monitoring frequency*
Monitoring	Remnant vegetation and rehabilitation health is monitored. Ecosystem health is maintained in adjacent areas to predevelopment status; and Ensure water quality controls and structures are in place and in correct working order maintaining pre track construction flows.	12 Month maintenance period is abided by Shellbay Holdings Pty Ltd from time of completed track construction works; and 6 monthly checks for a period of 3 years by the Environmental Officer as per Revegetation Plan, Weed Management Plan, Dieback Management Plan and Fauna Management Plan; and Consultation with the DEC and Shire of Manjimup as required on any aspect of the track management.	Shellbay Holdings Pty Ltd. Bio Diverse Solutions	Localised deaths of remnant vegetation from rehabilitation within road reserve. Water flows obstructed, pooling of water in previous areas not historically occurring; Weed infestations occur; and Biodiversity of local area is reduced	Regular maintenance patrols and reports by Environmental Officer; Consultation with the DEC regarding any unusual ecosystem health indicators; and Continue photo monitoring points for wetland areas and establish new points for revegetation sites.	Quarterly and informal checks for first 12 months, 6 monthly checks for a period of 3 years.
Fauna Management	Remnant vegetation and rehabilitated areas attracts native fauna; Mature trees are conserved to attract native fauna and to be maintained for habitat; Thick areas of remnant vegetation are conserved to provide shelter and habitat for native fauna; and There is no displaced fauna or unusual deaths.	Informal checks along the road reserve, Hydrological flows are maintained in wetlands and creeks to pre track construction conditions. Track speeds a maintained as a low speed environment to ensure wildlife not affected; and Signage and gates in place to ensure no illegal entry to national park.	Shire of Manjimup Shellbay Holdings Pty Ltd.	Fauna diversity; Signs of habitat use by local species in road reserve; and Fauna stay within remnant areas.	During maintenance visits, wildlife noticed in remnant areas. Rehabilitated areas are vigorous and show no signs of demise.	Informal checks
Fire Management	Prevent Fire Hazards within Doggerup Road Reserve.	Ensure fuel loads in adjacent uncleared areas are managed in consultation with the DEC; Access along the track is unimpeded for emergency entry/egress. Ensure any maintenance activities with machines do not occur on High Fire danger Index (FDI) days.	Shellbay Holdings Pty Ltd.	Fire occurrence is minimal or none; and All structures are in good working order from regular checks. Track is accessible at all times for emergency access/egress.	Leaf litter including wood material and grasses poses minimal fire hazard; Machine movement bans during high FDI; and No fires originating from Doggerup Road access track.	Yearly prior to summer period.

Regular management and maintenance will be carried out via the proponent for a post construction period of 12months 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 Shellbay Pty Ltd. Shellbay Holdings Pty Ltd have given a commitment to maintenance through the release of the EMP and the PER document.

7 Threatened Flora Management Plan

The following likely impacts have been 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 dieback 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.

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.

The methodology which will be employed to ensure Threatened Flora and species of significance are avoided where possible includes the following:

- Environmental Officer to undertake site identification 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.

8 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 dieback infected area.

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 consutlation 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 conditons 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, demarcatcion, turnarounds and any other hygiene management requirements after site walk over with DEC officers.

8.1 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.

8.2 Demarcation

Where *Phytophthora cinnamomi (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.

8.3 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.
- The uninfested section at the western end of the track, adjoining the private property.

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

The track construction limestone materail must have certified "Disaease Free" Limestone utlised.

The *Phytophthora cinnamomi* Protectable Areas Map produced for the area has proposed age limits. Map boundaries should be checked before operations proceed if the map is older than one year 11/3/2012. This map expires and therefore should not be used if it is older than three years since the original interpretation for this map 11/3/2014.

8.4 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"**.

Table 4 – Guide for movement of soil

Moving from ↓	***To*** → Infested (pest or disease)	Uninfested
Infested		Clean on entry
Uninfested		Clean on entry
Uninfested protectable		

No Clean down required

Clean on Entry: **All vehicles and machinery to be cleaned prior to moving across demarcation line**

Note: **Uninfested Protectable** areas moving to **uninfested** areas do not require clean-down as this should already have occurred before entering **uninfested protectable** areas.

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 dieback 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 cleandowns 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 Phytophthora 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.

8.5 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. The material will be independently certified as being "Free of *Phytophthora cinnamomi*" 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.

9 Fauna Management Plan

The site has been surveyed for significant Fauna under the *Wildlife Protection Act 1950* and the *Environmental Protection and Biodiversity Act 1999,* please refer to Preliminary Fauna Survey Report (K.Kinnear 2011). A Targeted Threatened Fauna Survey was undertaken in March 2011 It was considered that the Doggerup Road Reserve contained some significant habitat for Quenda (*Isoodon obesulus fusciventer*), and significant habitat trees (and future tree habitat/feed trees) for the Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) and Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*).

The fauna survey found that there was evidence of habitat of the Quenda within the Karri forest areas and 1 feed tree noted for the Forest Red-tailed Black Cockatoo or Carnaby's Black Cockatoo adjacent to the Windy Harbour Road. No suitable habitat was located for the Western Ringtail Possum. It is proposed as part of management of significant habitat trees for Black Cockatoos and other native fauna, that all 66 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 following management measures have been developed and incorporated into the Engineering Specification 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 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 "Excellent" habitat areas 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, 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 concrete re-enforced pipes to ensure hydrological flows are maintained in wetland areas for fish species.

The following management controls are to apply 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;
- Ensure bushfire control measures are in place during all operations (no vehicle movement on "Very High and extreme" FDI days, fast attack unit on site etc).
- 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 pre-construction site inspection will be undertaken by the Environmental Officer to flag any habitat trees/trees to be retained (Refer to Section 5.1.1). A site walk over will be undertaken with

local DEC Officers to ensure any further environmental considerations are managed. Mapping will be produced for site personel during constuction periods.

An environmental briefing will occur prior to construction activities commencing to inform the Project Manager, Site Supervisor and all machine/vehicle operators of any sensitve areas and flag tape/signage/demarcation requirements. If during site works, there is any evidence of Threatened Fauna present (as listed in the Preliminary Fauna Report) then the Environmental Officer should be notified and work cease until a site assessment has been undertaken.

Breifing information to site personnel will include but not be limited to:

- Habitat tree flagging and demaracation;
- Ensure all soil works are a minimum distance of 1m away from base of all 66 Habitat trees;
- Ensure that any Threatened or suspected to be Threatened Species are reported to the Environmental Officer; and
- Ensure all operations are undertaken with a minimal footprint and the clearing of native vegetation is restricted to defined and necessary areas.

10 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 (Milner, J 2011) 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 comform to this 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 Road Reserve.

10.1 Aims of Weed Management Plan

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 landholder; and
- Initial follow up spraying will be undertaken at 6 months and 18 months and repeated as necessary.

10.2 Program for weed control

The following 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 this Weed Management Plan. The following table (Table 4) 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 any infestations promptly. Further information for any species not listed in Table 5 should be gained from the Department of Agriculture and Food.

Table 5 – Weed Management Program

Species		Treatment	Responsibility
Grasses			
Kikuyu	*Pennisetum clandestinum*	Control with herbicides whilst growing.	Spray/ Civil Contractor as required
African Love Grass	*Eragrostis curvulata*	Annual Spray during winter, small infestations all year round as required	Spray/ Civil Contractor as required
Blowfly grass	*Briza maxima*	Hand weed or spraying. Cool burn in late winter to spring before flowering.	Spray/Civil Contractor as required
Flat weed	*Hypochaeris spp*	Annual Spray during winter, small infestations all year round as required	Spray contractor and Civil contractor
Hare's-tail Grass	*Lagurus ovatus*	Prevent seed set for 2-3 years by the removal of the topsoil through civil works	Spray and Civil
Woody Weeds			
Golden wattle	*Acacia longifolia*	Fire not favourable at this site. Spraying (diesel) to lower trunk and/or injection on mature trees. Spraying or wiping on seedlings and juvenile trees.	Contractor, spray contractor, bobcat
Taylorina	*Psoralea pinnata*	Treat seedlings early summer with Glyphosate, juveniles can be hand pulled. Fire not recommended. Slash or doze large trees.	Contractor, spray contractor, bobcat
Blackberry	*Rubus ulmifolius*	Mechanical control difficult. Annual summer applications of Grazon, 3 applications required, use Glyphosate in sensitive areas (i.e. creeklines)	Contractor, spray contractor, bobcat
Ink weed	*Phytolacca octandra*	Uproot heavy infestations and cut remaining plants 5cm below ground. Spraying is effective.	Spray and civil contractor
Herbs			
Spear thistle	*Cirsium vulgare*	Manual removal or selective spray control	Spray contractor and civil contractor
Night shade	*Solanum nigrum*	Prevent seed set for several years. Hand remove plants before flowering and/or spray during the plant is growing in summer.	Spray contractor
Fleabane	*Conyza species*	Spray in late spring. Hand removal- remove taproot. Introduction of native species which provide shade.	Spray Contractor/Civil contractor
Dolichos Pea	*Dipogon lignosus*	Manual removal difficult. Burning not recommended. Spraying of Tordon until run-off in August annually.	Spray Contractor/Civil contractor

Ref: Wheeler (2002)

10.3 Management and Control of weeds

Initial management will be undertaken by Shellbay Holdings Pty Ltd 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 Shire of Manjimup if required. Advice will be given to the Shire from the Environmental Officer through regular inspections as per table 2 for a period of 3 years post construction. Refer to Table 3 for Long Term Management Actions and timeframes.

Briefing information to site personnel 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.

11 Rehabilitation Management

Rehabilitation will be to constructed soils and a return to remnant vegetation. The rehabiltiation 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. Refer to MPM Development Consultants Engineering Report (Pippin C 2010) for more detail on Wetlands/creek construction methodology.

11.1 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.
- Rehabilitation will be carried out promptly after soil disturbance.

11.2 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).

11.3 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.

11.4 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 (Pippin C 2010) topsoil will only be removed from the base of the track pavement prior to the installation of limestone track base material, where it is absolutely necessary. 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. However, 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.

11.5 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 development activities with any bare ground areas stabilised (i.e. mulching with removed vegetation).

11.6 Acid Sulfate Soil Management

As the Engineering design does not involve excavation or disturbance of soils to creek areas, there is no requirement to treat Acid Sulfate Soils. Refer to the Acid Sulfate Soil Investigation report (K.Kinnear 2010) and the accompanying letter of approval of the report (DEC September 2011).

The Environmental Officer is to ensure all site personnel are fully briefed on the sensitive nature of the wetland areas and the “No Soil Movement Policy” for all site works along the Doggerup Road Reserve wetland and creek areas.

12 Timeline for implementation

The construction of the site is dependent on the approval of the Environmental Impact Assessment Process through the WA EPA and 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).. Upon approval received from these departments, construction is proposed will take four to 6 weeks in the driest time of the year (end of summer months and prior to Autumn and winter seasonal rains) to lessen any impact to wetlands and creek areas. A generalised implementation for each construction of the track is shown below in Table 6.

Table 6 – Generalised Implementation Program

Activities	Duration	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	12 months	18 months	2 years
Pre-construction	2 weeks									
Construction	3-4 weeks									
Post Construction	4-6 weeks									
Long term Actions	2 years									
EMP Review	2 years									

It is recommended that this EMP is reviewed post construction stages with a site walk over with the Shire and DEC. Any factors which need to be considered for long term management should be documented into the updated EMP/post construction report. At the end of the two year monitoring period the long term maintenance of the rod Reserve will become the responsibility of the Proponent Shellbay Holdings Pty Ltd in entirety. Any further long term requirements of the road management should be documented into an updated EMP or maintenance schedule.

At each stage/activities the management goals/objectives should be met prior to the next phase. Meetings between all members of the project group shall identify any environmental non-conformances. Meetings/briefings will be held weekly on site during the track construction period. The project group meetings shall be minuted and action items identified during each stage. It is anticipated that project meetings and site inspections could be more frequent during the construction phases as this is the period of highest risk for environmental harm to occur.

The goals and objectives for each stage have been clearly defined in Section 3 of this document, these are noted against each individual activity as identified prior to the commencement of this project.

13 Consultation Process

To ensure that all aspects of the project encompass current best practise, legislative requirements and guidelines, the following consultation plan shall be implemented.

Consultation shall occur with government agencies:

- At completion of the EMP document and prior to implementation, for feedback and comment regarding the document;
- A site meeting/walk over with government agency representatives prior to commencement of any site works to confirm refuelling area, demarcation, turnarounds, areas of concern etc.;
- During the preparation of the Environmental Management Plan; and
- Post construction periods.

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, track design, control measures implemented and ongoing management.

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

- DEC Warren Region– Peter Keppel, Brad Barton, John Gillard,
- Shire of Manjimup – Gerard Treacy, Doug Elkins

Personnel whom contact and consultation has been initiated regarding the proposal include:

- Department of Indigenous Affairs
- DEC Contaminated Sites Branch
- DEC Species and Communities Branch
- Wildflower Society;
- South West Catchments Council;
- Conservation Commission; and
- Heritage Consultants for the area.

Regular consultation shall occur during track construction with other stakeholders as required and will include but not be limited to:

- Neighbours, including DEC Pemberton District Office;
- Aboriginal elders and heritage consultants;
- Community groups;
- Wildflower Society;
- Conservation Council; and
- Interest groups.

Regular meetings should be held with the project group to ensure that information is being disseminated throughout the project. The project team includes the Environmental Officer, Engineer, Project Manager, Construction Manager and Site Supervisor. Minutes of meetings and action items should be documented for reference and action. The Environmental Officer shall have overall responsibility of conveying information to relevant government agencies regarding any environmental issue or concern.

14 Conclusion

Shellbay Holdings Pty Ltd commissioned Bio Diverse Solutions as Environmental Consultants to prepare an Environmental Management Plan to implement during the construction of an all-weather access track along Doggerup Road Reserve. This Environmental Management Plan (EMP) has been compiled to address legislative requirements and align best practise actions to implement the clearing of the track access along Doggerup Road Reserve to Nelson Location 7965 in an environmental, social and economically sustainable manner. The EMP aims to meet objectives of the development of an all-weather track and produce environmental management actions to mitigate any adverse impacts on the natural environment.

Shellbay Holdings Pty Ltd have given undertaking to commit to the procedures/actions outlined in this document through the documentation of this EMP Report and the appointment of an Environmental Officer (Kathryn Kinnear Bio Diverse Solutions) and Project Manager/Civil Engineer (Craig Pippin MPM Development Consultants) to administer all pre, during construction, post construction and long term management recommended activities to ensure that the environmental objectives and protocols of this EMP are met and implemented.

This EMP aligns activities and responsibilities to pre-construction/vegetation clearing, during construction and post construction activities. The plan makes specific construction actions for Shellbay Holdings Pty Ltd to align duties to the Project Manager, Environmental Officer, Site Supervisor and Machine Operators. The plan also documents the long term maintenance and performance indicators for site's environmental management post construction.

It is recommended post construction that any additional the long term ongoing maintenance and management actions are included into an updated EMP or an operational procedures manual to guide any future owners of Nelson Location 7965 with regular communication to occur with the Environmental Officer regarding the site for a minimum period of 3 years post construction. The Environmental Officer will continue monitoring of the Road Reserve formally and informally for a period of 3 years post track construction. Should any aspect of the construction of the all-weather track project change then it is recommended that this EMP plan be reviewed and the revision record updated (refer to Section 14).

It is further recommended by Bio Diverse Solutions that if this EMP is implemented as documented, then the construction of an all-weather access track at Doggerup Road Reserve can be implemented sustainably and in an environmentally sound manner.

15 EMP Revision Record

Date	Revision	Prepared By	Reviewed by/sent to:	Copies	Approved for release
9/11/2011	Client Draft	Kathryn Kinnear	B & C Owens	1 Electronic (email)	10/11/2011
10/11/2011	Draft Id 10/11/2011	Kathryn Kinnear	MPM Development Consultants	1 Electronic (email)	21/11/2011
21/11/2011	Draft Id 21/11/2011	Kathryn Kinnear	Shire of Manjimup – Doug Elkins	1 hard copy	
21/11/2011	Draft Id 21/11/2011	Kathryn Kinnear	DEC – Brad Barton	1 hard copy	
06/03/2012	Draft Id 06/03/2012	Kathryn Kinnear	DSEWPC & OEPA	1 Electronic (email)	06/03/2012
2/5/2012	Draft Id 02/05/2012	Kathryn Kinnear	DSEWPC & OEPA	1 Electronic (email)	02/05/2012

16 References

Brand, S (NAC) (March 2011) *Wetland Assessment Doggerup Road Reserve.* Unpublished report prepared for Shellbay Holdings Pty Ltd. Natural Area Consulting, 99C Lord Street Whiteman WA.

CALM (2003) "Phytophthora cinnamomi and Disease Caused by it, Volume I - Management Guidelines", Department of Conservation and Land Management, Dwellingup Training Centre.

DEC (2011) Formal Correspondence Recieved byAndrew Milner, Contaminated Sites Branch, Department of Environment and Conservation, Dick Perry Avenue Kensington WA.

DEC Spill Management Procedures fact sheet from DEC website accessed March 2011: *www.dec.wa.gov.au/component/option,com_docman/task.../gid,1752*

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.

EPA Principles of Environmental Protection (2004) Position Statement No.7.

EPA (Clearing Native Vegetation) Regulations, EPA Act 1986.

Fire and Emergency Services Authority WA (FESA) (2009) *Prepare. Act. Survive*. Government of Western Australia, Fire and Emergency Services Authority.

Fire and Emergency Services Authority WA (FESA) (2004) The Homeowners Bush Fire Survival.

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

Kinnear, K (2011) *Acid Sulphate Soils Investigation.* Unpublished report prepared for Shellbay Holdings Pty Ltd. Bio Diverse Solutions, 55 Peppermint Drive Albany WA.

Kinnear, K (2011) *Preliminary Fauna Report (Level 1 Fauna Survey).* Unpublished report prepared for Shellbay Holdings Pty Ltd. Bio Diverse Solutions, 55 Peppermint Drive Albany WA.

Kinnear, K (2011) *Environmental Scoping Document (ESD) Public Environmental Review Assessment No 1836, Doggerup Road Reserve.* Unpublished report prepared for Environmental Protection Authority WA and Shellbay Holdings Pty Ltd. Bio Diverse Solutions, 55 Peppermint Drive Albany WA.

Moore Ian (2011) *Report and recomendations for the mapping of the disease caused by Phytophthora cinnamomi (P.C), Doggerup Access Track, Malimup Block*. Unpublished report prepared for Shellbay Holdings Pty Ltd. Moore Mapping Pty Ltd IT Moore Mapping Trust, PO Box 924 Manjimup WA.

Pippin, C (2010) *Engineering Assessment Doggerup Road, Windy Harbour*. Unpublished report prepared for Shellbay Holdings Pty Ltd. MPM Development Consultants Unit 1/33 Constitution Steet Bunbury WA 6230.

Milner J (NAC) (March 2011) *Doggerup Road Reserve Flora Survey.* Unpublished report prepared for Shellbay Holdings Pty Ltd. Natural Area Consulting , 99C Lord Street Whiteman WA.

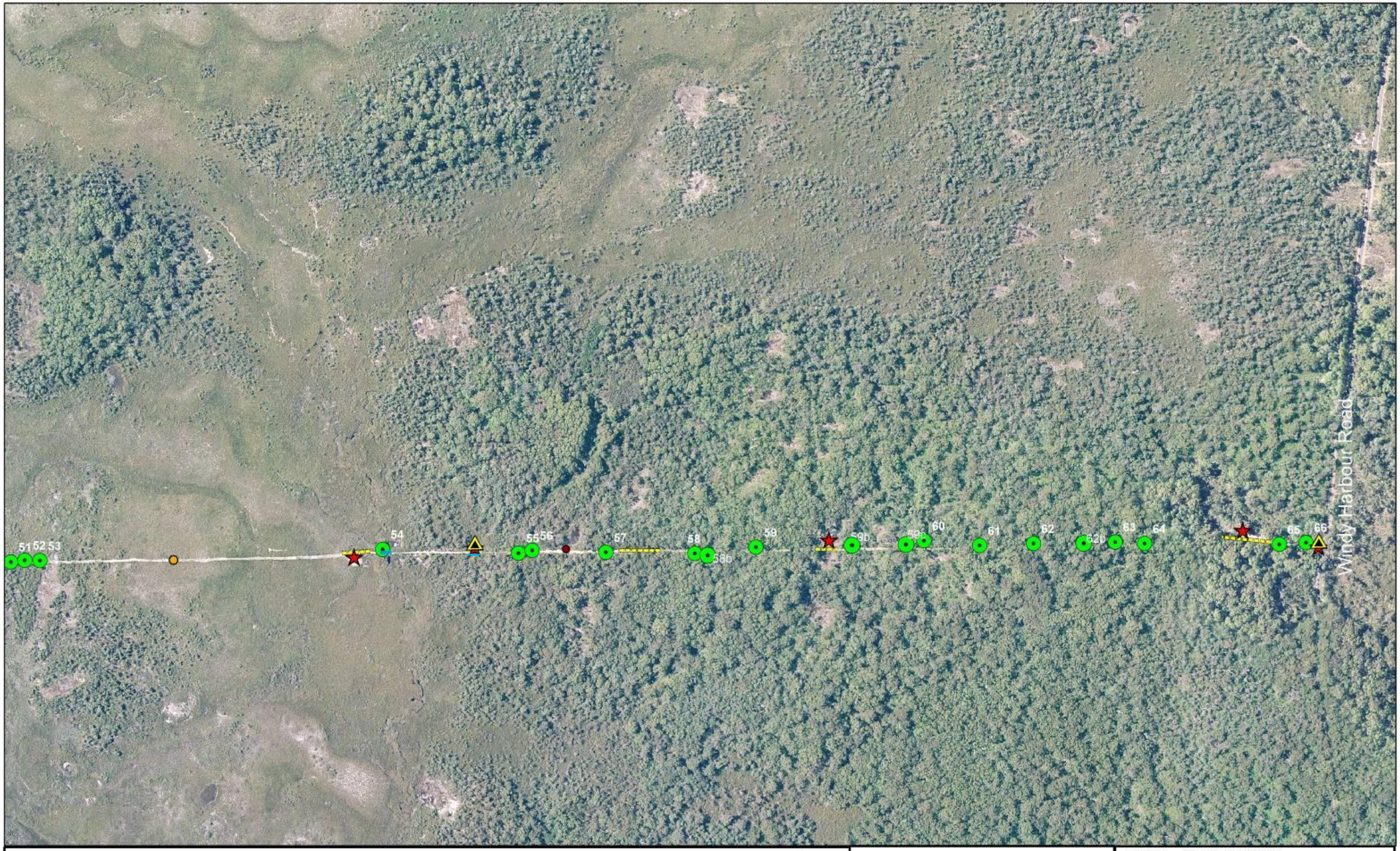
Webb, W (2011) *Aborginal Heritage Report.* Unpublished report prepared for Shellbay Holdings Pty Ltd.

Wheeler, J., Moore, J. (2002) Southern Weeds and Their Control. Department of Agriculture of Western Australia Bulletin No4558/02

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

Appendix A

Construction Mapping



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 Cleandown
- Turnaround Areas
- Passing lanes
- Habitat Tree

Scale
1:5500 @ A3

0 62.5 125 250 375 500 Meters

BIO DIVERSE SOLUTIONS
55 Peppermint Drive
Albany, WA 6330
Australia
Tel: 08 9841 3936
Fax: 08 9841 3936
Mob: 0447 555 516

CLIENT Shellbay Holdings
Doggerup Road
Windy Harbour

Construction Plan Page 1

STATUS	FILE	DATE
DRAFT	LAND001	06/03/2012

39 38 40 41 42 43 44 45 46 47 48 50 49 51 52 53

Legend

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- Flora - A.sp Scott River
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CLIENT Shellbay Holdings
Doggerup Road
Windy Harbour

Construction Plan Page 2

STATUS	FILE	DATE
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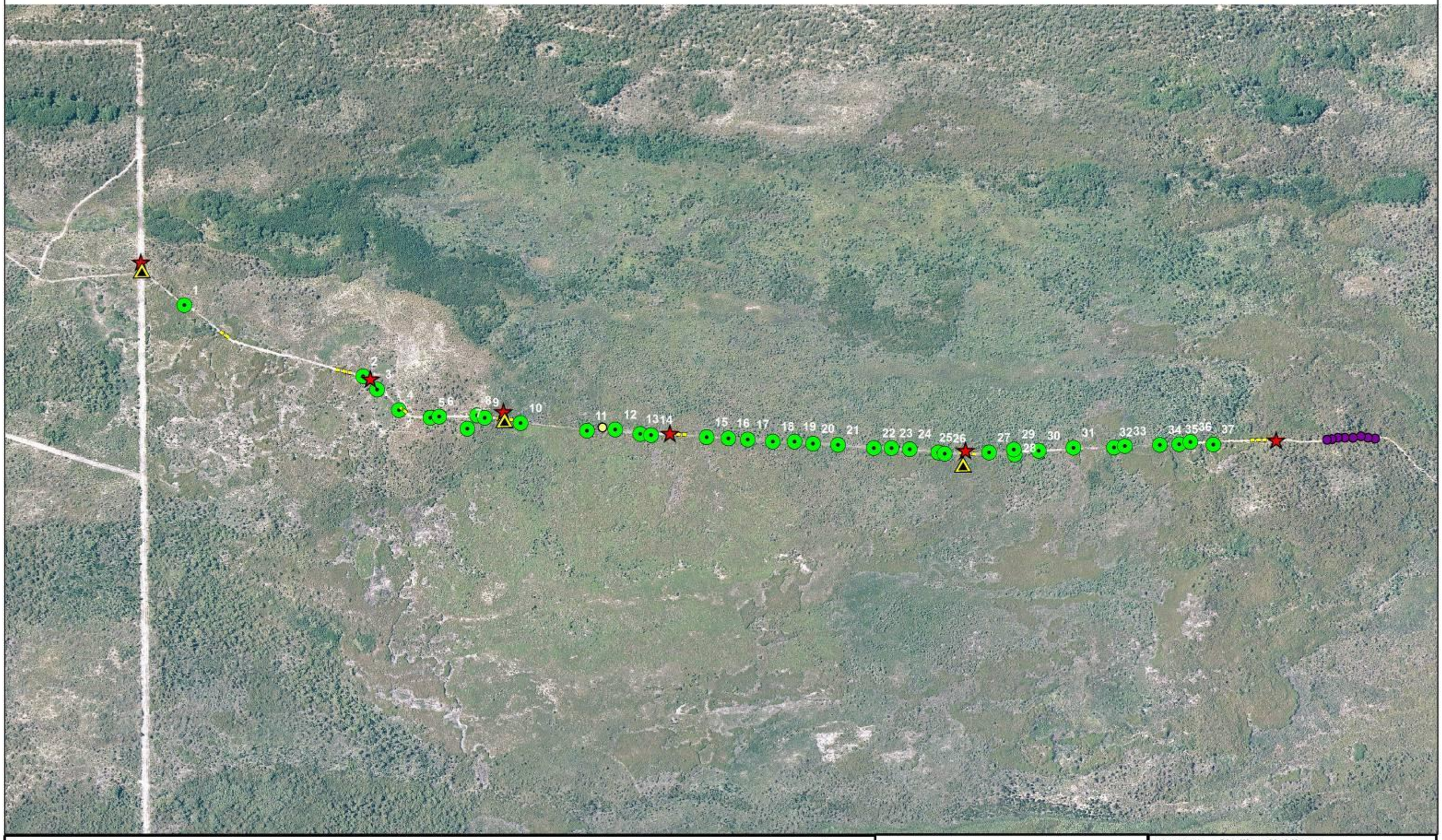

Legend

- Flora - A.barbata
- Flora - A.sp Scott River
- Flora - G.filiformis
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CLIENT Shellbay Holdings
Doggerup Road
Windy Harbour

Construction Plan Page 3

STATUS	FILE	DATE
DRAFT	LAND001	06/03/2012

Government of **Western Australia**
Department of **Environment and Conservation**

Your ref:
Our ref:
Enquiries: Brad Barton
Phone: 97 717 933
Fax: 97 771 363
Email: Bradley.Barton@dec.wa.gov.au

Kathryn Kinnear
Director
Biodiverse Solutions
55 Peppermint Drive
ALBANY WA 6330

Dear Kath

Subject: Draft Environmental Management Plan – Nelson Location 7965 (Sandy Peak)

Thank you for supplying the Department of Environment and Conservation (DEC) Warren Region with a copy of the Draft Environmental Management Plan for Nelson Location 7965 (Sandy Peak), Doggerup Road in the Shire of Manjimup.

Consistent with Environmental Protection Authority process, it is DEC`s understanding that assessment of the scoping document is the responsibility of the EPA, and to this point in time they have not sought government agency input. Until this occurs, a review of a draft EMP by DEC could be construed as pre-empting the outcomes of an Environmental Protection Act process.

The above being the case, DEC`s Warren Region is unable to provide any advice to you on the draft EMP. We look forward to reviewing the environmental impact assessment during the public environmental review period.

Yours sincerely

per Bradley Barton

Peter Keppel
Regional Manager
Warren Region

7 December 2011

cc: District Manager, Donnelly District

Warren Region
Brain Street, Manjimup
Phone: (08) 97 717 988 Fax: (08) 97 771 363
Postal Address: Locked Bag 2, Manjimup, Western Australia 6258
www.dec.wa.gov.au

Our Ref: ST0371
Your Ref:
Enquiries: Patrick Steinbacher

SHIRE OF MANJIMUP
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Web: www.manjimup.wa.gov.au
A.B.N. 36 453 349 691

2 February 2012

Kathryn Kinnear
Bio Diverse Solutions
55 Peppermint Drive
ALBANY WA 6330

Dear Kathryn

RE DRAFT ENVIRONMENTAL MANAGEMENT PLAN
NELSON LOCATION 7965
DOGGERUP ROAD

I refer to your letter and accompanying Environmental Management Plan for the proposed works at the above location, and apologise for the delay in reply.

I can confirm that the Shire of Manjimup has no concerns regarding the EMP and supports the proposal in principle, with the reiteration that the Shire is not responsible for:

- Any construction or ongoing maintenance activities;
- Any initial or ongoing environmental monitoring or other related activities; and
- Any costs related to the above or any other aspect of the project.

Additionally, closer to the commencement of the construction of the project the Shire will be seeking some form of assurance from the proponents that they will have the capacity to carry out the works to completion to the satisfaction of all stakeholders and that no residual responsibility will be brought to bear upon the Shire.

For your general information, a traffic management plan will also be required to be lodged with the Shire prior to commencement to cover any works within the Windy Harbour Road reserve.

If you have any enquiries please do not hesitate to contact me by phone 9771 7777 or email info@manjimup.wa.gov.au

Yours faithfully

Doug Elkins
DIRECTOR WORKS & SERVICES

Appendix 4

Acid Sulfate Soils

Doggerup Road
Reserve
Shire of Manjimup

Acid Sulfate Soil Investigation

Kathryn Kinnear

Bio Diverse Solutions

8/04/2011

BIO DIVERSE SOLUTIONS

ACID SULFATE SOIL INVESTIGATION

APPENDICES

LIST OF TABLES

LIST OF FIGURES

1. Executive Summary

Shellbay Holdings Pty Ltd (Proponent) proposes to construct a limestone track along a gazetted road “Doggerup Road” 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 an all weather access track at their own expense.

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 the property (Nelson 7965) was freeholded. Nelson Location 7965 is a private property adjoining the south coast and is surrounded by D’Entrecasteaux National Park. Doggerup Road extends from Windy Harbour Road to Nelson Location 7965 adjacent to the National Park for approximately 6.5 km, of which 1.5km was cleared by the Shire of Manjimump approximately 40 years ago.

There is no permanent road access to 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, which is impassable during winter due to water inundation. Permission from the Department of Environment and Conservation (DEC) via a permit is necessary each time the owners want to use this track.

A single lane stabilised limestone track (all weather) is proposed to be developed and deemed adequate for the small number of vehicles which would use the road.

As per the WAPC Acid Sulfate Soils Self Assessment form, a Preliminary Investigation including laboratory analysis is required to be conducted prior to any development occurring. The Preliminary Investigation involves a desktop survey, site analysis and soil sampling with laboratory analysis.

This report outlines the findings of these investigations and provides recommendations with respect to the presence of Acid Sulfate Soils (ASS) which include both Actual Acid Sulfate Soils (AASS) and Potential Acid Sulfate Soils (PASS) within the Doggerup Road Reserve, Windy Harbour.

Results show none of the samples recording Actual Acid Sulfate Soils (AASS). Six samples met Possible Acid Sulfate Soils (PASS) criteria, including sulphur levels in the exclusion analysis. All other samples recorded no acid sulfate soils.

MPM Development Consultants have been engaged to provide civil engineering advice for the construction of the all weather track along Doggerup Road Reserve. As part of the development of the all weather track, areas crossing wetland areas where PASS was identified shall not be disturbed with a No-Soil Movement policy implemented. It is proposed to “float a road” with culverts to enable continuation of surface water movement as well as providing a stabilised track. As limestone is the material proposed to be used any existing acidity shall be neutralised through the process.

Bio Diverse Solutions conclude that if the methodology for the track construction as outlined by MPM Development Consultants is undertaken by Shellbay Holdings Pty Ltd in accordance with those specifications, there can be minimal risk of ASS being disturbed or affecting the local biodiversity of the subject site and adjacent national park

2. DEC Site Summary Form

Department of Environment and Conservation

Site Summary Form - Acid Sulfate Soils Assessment

To be completed by the person(s) submitting a report(s) to be assessed by the Department of Environment and Conservation (DEC) as per the information requirements of the DEC Acid Sulfate Soils Guideline Series. Completing this form enables DEC to maintain an accurate and consistent record for the site and expedites/streamlines the report assessment process.

Please note: A completed site summary form must accompany each report submitted to DEC for assessment.
Each box must be filled out appropriately. Please do not write "refer to report" in any section.
Copies of all relevant Certificates of Title must accompany this form.

Site location details:

Site name (e.g. where site may be known by a common/ business name): Doggerup Road

Lot no.: N/A | **House no.**: N/A | **1 Street**: Doggerup Road Reserve

2 suburb: Windy Harbour | **3 state**: WA | **Postcode**: 6262

Crown Reserve (if applicable): N/A

Certificate(s) of Title (or equivalent): Volume/Folio:

Is a hard copy of Certificate of Title and associated sketch for the site attached? (Y/N)
If not, why not?: N

WAPC condition no.
(attach a copy): N/A

Current Owner/Occupier details:

Site owner (name and address): Shire of Manjimup

Site occupier (name and address): Shire of Manjimup

Site status (at time of reporting):

Previous and current land use (e.g. market gardens, industrial, landfill, marina): Road Reserve

Proposed land use (e.g. high density residential/childcare facility, ornamental lake, canal development): Residential Access 3m limestone all weather track

Nature of proposed works (e.g. installation of deep sewer, cut and fill, excavation for ornamental lake): Fill of wetland areas for road formation above winter water levels

Are acid sulfate soils (ASS) present on the site?: No, PASS identified

Proposed Works:

Do you believe ASS are likely to be disturbed through excavation?
(If yes, provide details e.g. soil volumes, depths, lateral extent, etc): No

Do you believe ASS are likely to be disturbed through groundwater modification? (e.g. dewatering, groundwater abstraction, drainage, aquifer recharge/re-injection) (If yes, provide details e.g. cone of depression, dewatering/drainage volumes, pumping rates, depths, lateral extent, etc)	No
If dewatering is proposed, have you applied for an appropriate licence from the Department of Water? If not, why not?	N/A
Is dredging proposed? If yes, provide details	No

Investigation details:

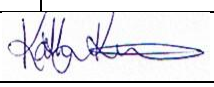
Desktop assessment (e.g. ASS risk map classification, elevation in mAHD, geological mapping, geomorphology, hydrology)	70-100% Risk of ASS occurring Refer to Appendix B of this document
Field observations of interest (e.g. description of soils, pH and peroxide field tests, water pH, acidity, iron mottling, eutrophic wetlands, acid scalds, MBOs etc)	Silty peaty soils in wetland inundated areas, no acid scalds, high organic matter present in samples.
Laboratory analysis techniques used to test existing acidity and acid generating potential in soil and water (e.g. SPOCAS, S_{CR}, water quality and list maximum results)	Bioscience WA - Samples were analysed according to DEC protocols for field tests, and for total carbon and sulphur by Leco induction furnace.
Where laboratory analysis has been undertaken, is the laboratory NATA accredited for all analytes and analytical methodologies used? (Laboratory name and location)	No however recognised by DEC as acceptable method
Identified substances and relevant substrates (e.g. sulphides in soil, arsenic in soil and/or groundwater, jarosite in soil, iron monosulphides, metal hydroxides)	N/A
Stratigraphy(s) with acid generating potential (e.g. silty sand, quartz, medium-grey, moderately-sorted, 10% organic matter, minor shell fragments)	Organic Matter, silt and peat present

Investigation history:

Have previous site investigations been conducted? (Y/N - if yes, please provide details below)	No
Report title, date and author (include whether any ASS testing formed part of the investigation):	Kathryn Kinnear, Bio Diverse Solutions 2011, Testing undertaken by Bioscience WA

Declaration:

The information contained in this site summary form is a true representation of the information contained in the attached report(s)/document(s).

Full name (print)	Kathryn Kinnear		
4 Position held	Environmental Consultant		
5 Signature		**Date**	13/04/2011

Please ensure that a hardcopy of the current Certificate(s) of Title and associated sketch accompanies the site summary form. DEC cannot proceed with the assessment of the report if this information is not provided.

3. Scope of Work

The subject site is the Doggerup Road Reserve where an all weather access track is proposed to be built. Shellbay Holdings Pty Ltd commissioned Bio Diverse Solutions to undertake an ASS Investigation as per DEC Guidelines. This Preliminary Investigation was undertaken as a component of an Environmental Impact Investigation aligned to EPA guidelines and undertaken in accordance with DEC Identification and Treatment Acid Sulfate Soils (2009).

Soils were collected, described and an ASS Exclusion Test was performed by Bioscience WA on soils samples collected within potential ASS risk areas of the Doggerup Road Reserve. This report outlines the findings of these investigations and provides recommendations with respect to the presence of Acid Sulfate Soils (ASS) and Potential Acid Sulfate Soils (PASS) within the Doggerup Road Reserve, Windy Harbour.

4. Background Information

The proposal is to clear remnant vegetation and construct an all weather access track from Windy Harbour Road to Nelson Location 7965, within the gazetted Doggerup Road Reserve, adjacent to the D'Entrecasteaux National Park. The project was referred to the Environmental Protection Authority 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 D'Entrecasteaux National Park. The final Guidelines were issued on 9 September 1997. Three draft PER documents were submitted in an effort to meet the requirements specified in the EPA Guidelines. Although the third draft did not adequately address a number of issues, the Chairman agreed that it could be released for public comment on the basis that a copy of the letter from the EPA seeking the review of the then National Parks and Nature Conservation Authority (NPNCA) on the proposal and a copy of the NPNCA's reply to the EPA were included in the PER. 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, including a comprehensive submission from the then Department of Conservation and Land Management.

On 11 February 1999, while the EPA was in the process of completing its assessment, the proponent attended a meeting with the EPA where they were given the opportunity to present their concerns. These included the EPA's requirement for further survey work and the proponent's opinion that without vehicular access, the density of vegetation prevented a more extensive survey of the flora, fauna and Aboriginal heritage sites.

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, 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 Location 7965. Legal proceedings followed and this led to Shellbay Holdings Pty Ltd subsequently withdrawing the proposal in December 2002.

Shellbay Holding Pty Ltd continues to seek legal and secure access to the property and consequently referred a new proposal to construct an all weather track from Windy Harbour Road to Nelson Location 7965 within the gazetted road reserve through D'Entrecasteaux on 13 October 2009.

As a result of this latest application (ESD 2010) and the subsequent Appeal to the EPA the proponent is addressing the following matters:

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

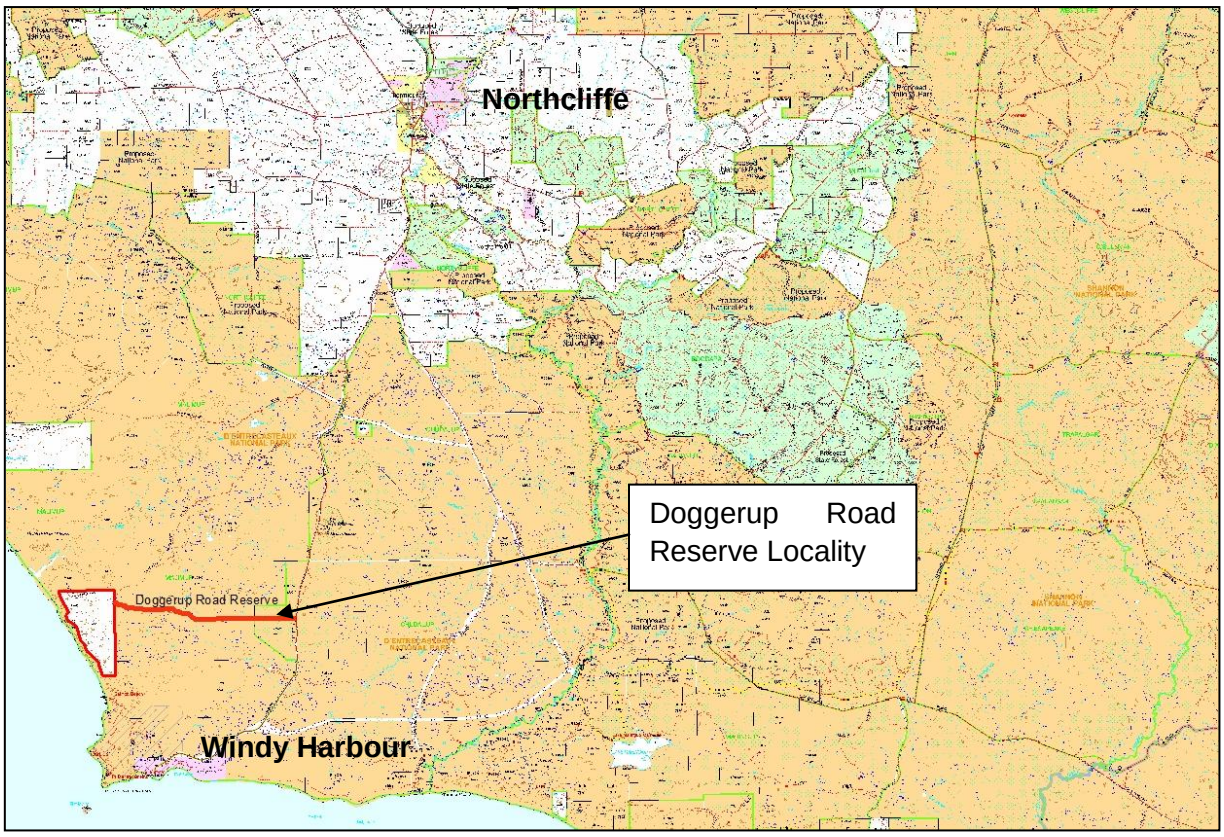
The EPA has determined that the principle of the conservation of biological diversity and ecological integrity is relevant to the proposal. The proponent has submitted an Environmental Scoping Document (ESD) to the EPA in 2010 as part of the Environmental Review process and this report forms part of the investigations as requested by the DEC and EPA.

5. Site Identification

5.1. 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. Geographic cartesian coordinates for the Doggerup Road Reserve are E 409155, N 6150335 at the eastern end connecting Windy Harbour Road and E 415343, N 6149774 at the western end bordering Nelson location 7965. Please refer to Figure 1 Project Locality below and Location Map Appendix A.

Figure 1 – Project locality



5.2. Land use and Tenure

The subject site, Doggerup Road, is Road Reserve and 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, 1960). The road access to the subject land was partially formed and graded by the Shire of Manjimup in the early 1960's. At that time the section of road was fully cleared but only constructed to a limestone standard within part of the road reserve from the Windy Harbour Road.

Doggerup Road is the formal gazetted access to Nelson Location 7965 Sandy Peak. Sandy Peak (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 that the Doggerup Road shall become a "Controlled Closed Road" which allows limited access into the location but will provide the proponents with all weather access to their property.

5.3. Identification of Proponent

The owners, Shellbay Holdings Pty Ltd comprises of four individuals and their families who purchased the property in March 1995 for recreational and lifestyle opportunities. In March 1995 they first wrote to the Government to initiate discussions regarding the construction of legal road access. The property is an enclave within D'Entrecasteaux National Park and Doggerup Road is the only legal access.

Name of the Proponent
Shellbay Holding Pty Ltd

Address of the Proponent
Shellbay Holding Pty Ltd
Carol and Barry Owen
Shellbay Holdings
5 Hovea Street
Manjimup WA 6258

Key Contact – Project Manager
Bio Diverse Solutions
Kathryn Kinnear
Environmental Consultant
55 Peppermint Drive
Albany WA 6330

6. Details of Development

The proposal is for the clearing of native vegetation and the construction of a 6.5 km (3m running surface) all weather limestone track from Windy Harbour Road to Nelson Location 7965, within a Gazetted Road Reserve Doggerup Road, adjacent to D'Entrecasteaux National Park, within the Shire of Manjimup.

6.1. Key Characteristics of Project

Table 1 – Key Characteristics

Non-spatial elements	**Description**
Project life	3 months construction period
Vegetation rehabilitation	All disturbed areas
Waste	No waste from project, topsoil re-used for rehabilitation, native vegetation mulched for rehabilitation
Spatial elements	**Description**
Footprint size of current road reserve	13 ha
Length of road	6.5km
Maximum width of track surface construction	3 metres
Maximum width of disturbance	20 metres
Construction material	Crushed limestone
Clearing native vegetation ha	Not more than 6.5ha along road within a 20m maximum disturbance boundary (Road Reserve).
Fire breaks	Not required
Threatened Ecological Communities	None to be disturbed
Threatened Flora	Not more than 60 Priority 3 - *Hemiandra australia*
Wetlands	Gardiner Watershed, 1700m^2 of creek crossings (3 sites)

6.1.1. General Specifications of the Road Construction

MPM Development Consultants have been engaged to provide civil engineering advice on the construction of the all weather track. It is proposed to construct a 3.0m wide compacted limestone roadbase material track. The track will be constructed in summer (dry) conditions only, and will be located within the existing Doggerup Road reserve to avoid any existing mature or potential habitat vegetation and will be designed to create a low speed environment. The purpose of the track will be to provide an all-weather, year round access to Nelson Loc 7965. It is proposed that the track will not be open to the general public in order to restrict the number of vehicles utilising the track. The track was partially formed and graded by the Shire in the 1960's. There remains evidence of gravel material and roadside drains on several sections of the track through the Karri.

The track will consist of limestone roadbase material placed on the existing ground surface and compacted to a thickness of 300mm. The 3.0m width approximates the existing cleared width of the track along several existing sections of the track, the construction of the all weather surface will thereby minimise any further disturbance to fringing or regrowth vegetation that has occurred since previous clearing operations along the track.

The natural ground surface along the length of the existing track and road reserve is only 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. The premise will be to minimise earthworks and restrict the area of disturbance.

6.1.2. Track Specification

The proposal for the track access on Doggerup Road is to minimise the impact of providing essentially a private access driveway for Loc 7965 by mandating the type of construction to the absolute minimum possible in order to protect the maximum area of vegetation and natural environment within the existing public road reserve.

Preliminary discussion with the Shire of Manjimup have indicated that they do not wish to have a rural type road constructed within the existing road reserve. 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 report or is wanted by the owners of Loc 7965. It would be proposed to construct the track with a series of guiding principles rather than undertaking a completely engineered design, this would enable flexibility during construction to ensure that the track footprint and any clearing are absolutely minimised.

The track would be constructed on top of the existing surface with only minimal clearing of the track footprint carried out prior to laying and compaction of the limestone. This is not the ideal or preferred method of track construction as it will lead to pavement failure due to non compaction of the surface prior to the pavement being placed and the eventual decay of the organic material that will remain beneath the limestone, however this method of construction will ensure minimal construction activity will occur. It will also allow for compaction of the underlying soils over a period of time, during road use rather than the underlying root systems being compacted before the limestone is placed and then after the limestone is placed. This will result in a track that will have maintenance issues over its life and will require improvements after the first year when the limestone settles.

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. Please refer to Photographs 1 below and 2 over the page.

Photograph 1- shown left is of the nearby Summertime Track and provides an indication of the type of construction proposed for Doggerup Road. The limestone material is placed on top of the existing ground surface without the formation of defined roadside drains. Note is also made here regarding how the approach to water crossings are made, where an existing water crossing is located beneath the guide posts in the photograph.

Photograph 2 - D'Entrecasteaux Road within the Windy Harbour townsite. A 3.0m wide limestone track with the vegetation regrowth occurring right up to and even overhanging the track. It should be noted that the track is constructed to take higher traffic volumes than that proposed for Doggerup Rd and has minimal track width, no defined drainage and the track elevated above natural surface level by the actual track pavement.

The track is proposed to be constructed in the same manner as the two local tracks as outlined in Photographs 1 and 2, with the slightly undulating land and minimal crossfall, there is no need for large areas of earthworks thus allowing the limestone roadbase to be simply placed directly onto the natural surface. The only area of disturbance will therefore be generally minimised to directly beneath the actual track.

The marginal cross fall of the existing surface will be accommodated by permitting the limestone roadbase material to be marginally thicker on one side of the track compared to the other or having the proposed track finished surface crossfall match the crossfall of the natural surface. The general track design cross section is shown right in Figure 2.

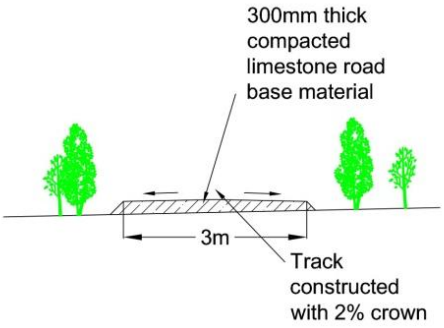


Figure 2 – General Track Cross Section (not to scale)

It is proposed to source the limestone road base material from within Loc 7965, to minimise the cartage distance required and the affect of large supply trucks will have on the track construction.

The limestone material will be tested to ensure no deleterious materials or potential contaminants are brought into the track area and that the material is a suitable road construction material.

6.1.3. Wetlands construction – No Soil Disturbance

The issue of stormwater drainage needs to be carefully considered in the construction of the Doggerup Rd track. The purpose of the tracks construction is to ensure an all-weather access to location 7965, however the provision of the track could potentially affect the existing surface water flows and infiltration.

As previously discussed the existing terrain is slightly undulating with minimal crosssfall 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 and potential drainage crossing. The drainage associated with the track is also helped by minimising the track footprint, less water is generated and with the absolute minimum clearing the water that is generated is not directed towards bare areas of soil but into the existing vegetation, significantly reducing potential erosion issues.

The existing/proposed water crossings are all generally at 90 degrees to the water flow direction, which will mean the track will not have to divert 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. By constructing the crossings out of limestone this will ensure that any earthworks required are absolutely minimised, as the existing material will not be disturbed.

Please refer to Photograph 3 and 4 below showing constructed culvert examples 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.

7. Site Conditions and Surrounding Environment

7.1. Surrounding Environment

Surrounding the Doggerup Road Reserve is D'Entrecasteaux National Park. The National Park adjacent to the subject site was gazetted on 28 November 1980 and is 116, 686 ha in size, managed by the Department of Environment and Conservation and Land Management (DEC) from the regional office at Manjimup and through district work centres at Pemberton and Northcliffe. The Department manages these areas on behalf of the Conservation Commission of Western Australia.

The adjacent D'Entrecasteaux National Park Comprises of two Class A reserves (no. 36996 and 43961) vested with the Conservation Commission and set aside for the purpose of 'national park and water'.

7.2. Topography and Surface hydrology

The Doggerup Road Reserve traverses undulating plains within the 25m and 50m contours. Lowest contours are at 25m in surface watershed areas 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 "Gardiner River" Local Catchment (SLIP 2010). The subject site is the upper watershed of the Blackwater Creek which is to the south east of the subject area. Blackwater Creek flows to the Gardiner River. Further to the north of the subject area the watershed is towards the Doggerup Creek system. Contour mapping shows that the subject site does not drain to the Doggerup Creek but to the Gardiner River watershed. The Road Reserve traverses 2 seasonal swamps, and minor creeks. These areas are winter wet, and summer dry. Please refer to Photographs 5, 6, 7 and 8 below.

Photograph 5 – View of intermittent swamp 116°037'E 34° 791' (Eastern swamp)

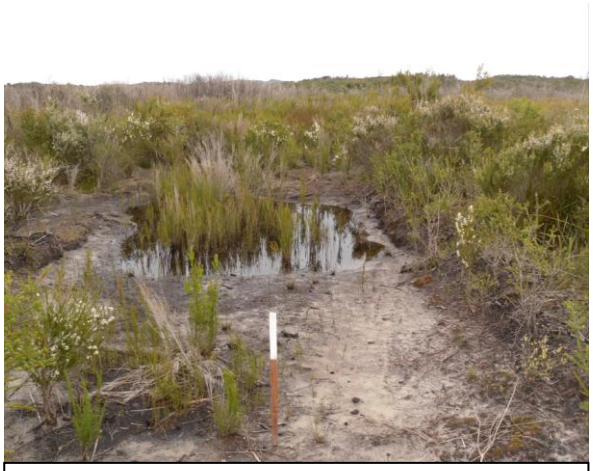
Photograph 6 – View of intermittent swamp 116°037'E 34° 791' (Eastern swamp).

Photograph 7– View of intermittent swamp 116°034'E 34° 789' (Western swamp)

Photograph 8 – View of creek adjacent to Karri/Jarrah in the east.

Preliminary site assessment over winter and spring indicates that the creeks and swamps are dependent on surface catchment and rainfall with water draining rapidly after rain events. Surface water area monitoring was commenced in August 2010 marking extent of water cover over the road reserve. Please refer to Photographs 9 and 10 below.

Photograph 9 – view of wet area in late winter, Winter water cover was to extent of pegs.



Photograph 10 – some pooling occurs from previous disturbance of road/clearing.

7.3. 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 subject site has been 80% cleared (Road Reserve) to 4m with the remaining edges of the cleared area having 20% intact vegetation. The karri forest has not been logged to local knowledge there is some localised deaths from fire events (K,Kinnear pers obs 2010).

7.4. Drainage, Hydrology & wetlands

The Doggerup Road is located within the Shannon River hydrographic catchment, and within the local catchment of the Gardner River (SLIP 2010). Water within the major wetland areas in and near the project site drain south east towards the Blackwater Creek which feeds into the Gardiner River to the south east. The road reserve is surrounded by ephemeral wetland areas that fill after significant rainfall events and then dry out. The Doggerup Creek System comprises extensive flats, Doggerup Lake, Lake Samuel, Lake Florence, Doggerup Creek and a number of unnamed swampy areas.

The wetlands in the vicinity of the Doggerup Road Reserve include:

- Permanent rivers and/or streams, less than 1 meter 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 wetlands within the project site mainly occur over sandy soils with fine layers of organic material, some peat is present within deeper portions of the large wetland areas. The water is very coloured due to the presence of tannins from vegetation and is consistent with other wetlands within the region (NAC 2011). A number of wet areas towards the eastern end of the road reserve have been created or modified by the Shire of Manjimup some 30+ years ago (pers comms Barry Owen 2011). A burrow pit adjacent to the road reserve near Windy Harbour Road becomes a wetland after significant rain events, but is otherwise dry.

8. Geology and Hydrogeology

8.1. 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 area traverses 5 Geology Soil and Landscape Map units. Table 3 below outlines the broad scale regional mapping of the subject area in regards to landform, geology and soils. Source of information from DoW Hydrogeology Map Series (DoW 2001) and Regional Soil-Landscape Mapping Shared Land Information Platform (SLIP 2010).

Table 3 – 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

Desktop Assessment indicate that Acid Sulfate Soils have a high to moderate (50-69%) risk in the 254BrBWp Map unit, being from Estuarine/lagoonal origin. Acid Sulfate Soil Risk Mapping is shown in Appendix D. Site investigation indicates the site is Loams over clay in the east (Karri Forest areas) grading to sands over granite through the central area and deep sands in the west (grading to dune systems). Please refer to Photographs 11, 12 and 13 over the page and soil profile sampling sheets Appendix C.

Photograph 11 – View of termite mound showing grey sands adjacent to granite outcrop.

Photograph 12 – View of loamy soil from scratching most probably from echidna in Karri forest area.

Photograph 13 - 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 along road reserve.

Photograph 14 – 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.

8.2. Hydrogeology and groundwater

Table 3 below outlines the DoW 250K Hydrogeology Mapping pertinent to the subject site.

Table 4 – Hydrogeology

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

It is anticipated that this project will not affect groundwater resources.

9. Sampling and Analysis Plan and Sampling Methodology

The sampling procedure was undertaken by Kathryn Kinnear and Dan Debunnetat of Bio Diverse Solutions in accordance with DEC Guidelines "Acid Sulfate Soils Guideline Series: Identification and Investigation of Acid Sulfate Soils – May 2009". For a summary of the field conditions please refer to Appendix C.

Sampling Procedure

Twelve test pits were hand excavated in and adjacent to the wetland areas within the Doggerup Road Reserve. Two samples were taken from each pit with a shovel and hand trowel. Depths varied from 150mm to 500mm. The soil samples were immediately placed into sealed air tight sample bags and then directly adjacent to ice bricks in a backpack. Samples were placed into an engel freezer within 2 hours of sampling. After the samples were frozen, a selection of 20 samples was couriered to Bioscience Pty Ltd in Perth for further laboratory analysis. The soil profiles were logged and later entered into a Soil Profile Sample Sheet. Please refer to Appendix C, Soil Profile Sampling.

Limitations to sampling procedure

The subject area (sampling 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. Test pits were hand dug to a depth of 500mm and placed adjacent to ice bricks in backpacks to be trekked out of the site. As there is no soil movement proposed in the wetland areas a depth of 500mm this was deemed sufficient to gain an understanding of the nature of the soils in regard to ASS occurrence.

9.1. Field Quality Assurance Quality Control

All samples were collected on the same day with the same weather conditions. All sampling

equipment was thoroughly washed down with clean water prior to excavation of each sample and gloves changed with new disposable ones.

9.2. Laboratory Quality Assurance Quality Control

Samples were analysed by Bioscience WA according to DEC protocols for field tests, and for total carbon and sulphur by Leco induction furnace.

Bioscience WA states:
The method we use was developed from the Instrument Manufacturers protocols, and adapted by us from development work undertaken in 2003. The procedure is:

- *Soils are dried to constant mass at 65^{o}C.*
- *Soils are ground to sub-75 um in a reciprocating ring mill.*
- *LECO CS200 is calibrated before analysis, then after every 10 samples analysed using a LECO standard soil which has S at 0.03%, and with blanks composed of combustion catalyst only. Catalysts used are LECOCELL II, and Iron Chip Accelerator, sample size is 300 mg.*
- *Drift has never been more than 0.25% per day.*

Sensitivity of the machine is 1 ppm S, reproducibility is 0.1% RSD.

9.3. Results

Samples were analysed by Bioscience WA according to DEC protocols for field tests, and for total carbon and sulphur by Leco induction furnace.

As per Bioscience WA findings - Actual Acid Sulfate Soils (AASS) have a field pH less than 4. None of the samples have so low a pH, so none are Actual Acid Sulfate (ASS).

Six samples, Test Pit 6 Sample 1, Test Pit 6 Sample 2, Test Pit 7 Sample 2, Test Pit 8 Sample 1, Test Pit 8 Sample 2 and Test Pit 12 Sample 1 met PASS criteria, including sulphur levels in the exclusion analysis. All other samples recorded no acid sulfate soils. Please refer to Appendix D, Bioscience Analysis Report.

9.4. Interpretation

As per Bioscience WA findings - Potential Acid Sulfate Soils (PASS) are indicated by exhibiting reduced sulphur at greater than 0.03% if a sand, or greater than 0.06% if a sandy clay and by also demonstrating at least one of the following:

- Oxidised pH of less than 3,
- pH reduction of more than 2 units when exposed to 30% hydrogen peroxide,
- moderate or higher reaction to peroxide.

Sandy Actual or Potential Acid Sulfate Soils have a reduced sulphur content of greater than 0.03% before management issues emerge. Bioscience measured the total sulphur content. If total sulphur is less than the reduced sulphur threshold, the soil cannot possibly be Acid Sulfate.

10. Risk Assessment

Disturbing potential Acid Sulfate Soils can have a destructive effect on plant and fish life, and on aquatic ecosystems. The risk of encountering and/or disturbing any potential acid sulfate soils within the Doggerup Road Reserve is extremely low as there is no proposed excavations and a “No Soil Disturbance” methodology of construction is proposed. Wetland areas will be under fill with culverts placed in areas of high flow. Fill will be comprised of Limestone material sourced within the Nelson Location 7965 and is anticipated to have a neutralizing affect on any acidic soils.

11. Recommendations

It is recommended that the track construction is undertaken as per MPM Consultants Civil engineering advice and wetland areas are placed under fill conditions with no soil movement in

these areas. This will ensure there is little risk of disturbing PASS soils and the use if Limestone material for the construction should have a neutralising affect on any acidic soils present.

12. Conclusion

Shellbay Holdings Pty Ltd commissioned Bio Diverse Solutions to undertake an ASS Investigation as per DEC Guidelines. This Preliminary Investigation was undertaken as a component of an Environmental Impact Investigation aligned to EPA guidelines and undertaken in accordance with DEC Identification and Treatment Acid Sulfate Soils (2009)

Twelve test pits were excavated in and adjacent to the wetland areas within the Doggerup Road Reserve. The subject area (sampling 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.

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. A subsequent risk assessment of the possibility of disturbing Acid Sulfate Soils is deemed to be low.

MPM Development Consultants have been engaged to provide civil engineering advice for the construction of the all weather track along Doggerup Road Reserve. Their advice has indicated that an all weather track can be formed in wetland areas without soil disturbance. The track material to be used is limestone which will have a neutralising affect on any acidity present (either organic or Sulfur from PASS).

Bio Diverse Solutions conclude that if the methodology for the track construction as outlined by MPM Development Consultants is undertaken by Shellbay Holdings Pty Ltd in accordance with those specifications there can be minimal risk of ASS being disturbed or affecting the local biodiversity of the area and adjacent national park.

13. References

Ahern, C.R., Ahern, M.R. and Powell, B. (1998) *Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils (ASS) in Queensland 1998*, Department of Natural Resources, RSC, Indooroopilly.

Dear, S.E., Moore, N.G., Dobos, S.K., Watling, K.M. and Ahern, C.R. (2002). Soil Management Guidelines. *In Queensland Acid Sulfate Soil Technical Manual*. Department of Natural Resources and Mines, Indooroopilly, Queensland, Australia.

Department of Water 1:250 000 Hydrogeology Map Series (2001) Mapping dataset, Government of 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 *Acid Sulfate Soils Guideline Series: Identification and Treatment Acid Sulfate Soils (2009).*

Department of Environment Guidelines *Acid Sulfate Soils Guideline Series: Treatment and Management of Acid Sulfate Soils– October 2004*.

Department of Environment *Acid Sulfate Soils Guidelines Series Identification and Investigation of Acid Sulfate Soils – May 2006*.

EPA Act 1986, State law Publisher, Government of Western Australia.

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

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.

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.

Natural Area Consulting, *Wetland Assessment Doggerup Road Reserve.* March 2011

Personal Communication from Barry Owens (Shellbay Holdings Pty Ltd) with Kathryn Kinnear Bio Diverse Solutions 2010.

Schoknecht, N., Tille, P., and Purdie, B., (2004) *Soil-Landscape Mapping South-Western Australia*, *Resource Management Technical Report 280*, Department of Agriculture, Government of Western Australia.

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

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

Appendices

Appendix A – Location Map

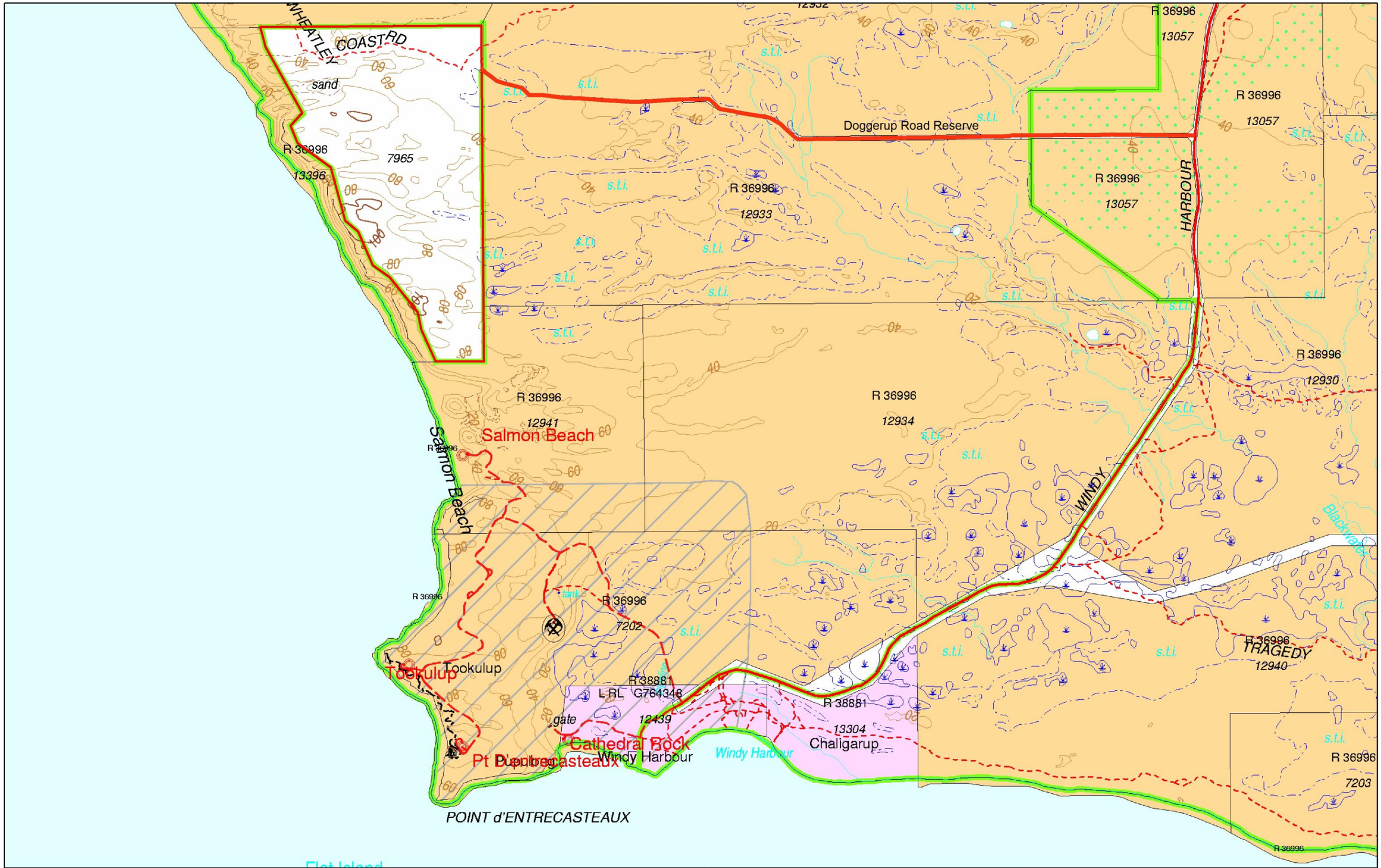
Appendix B – ASS Risk Mapping

Appendix C – Soil Profile Sampling

Appendix D – Bioscience WA Analysis Report

Appendix A

Location Map, Doggerup Road



Legend

Nelson Location 7965

SCALE

1:30,000 @ A3

0 0.250.5 1 1.5 2 Kilometers

BIO DIVERSE SOLUTIONS

55 Peppermint Drive
Albany, WA 6330
Australia
Tel: 08 9841 3936
Fax: 08 9841 3936
Mob: 0447 555 516

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

Doggerup Road, Windy Harbour

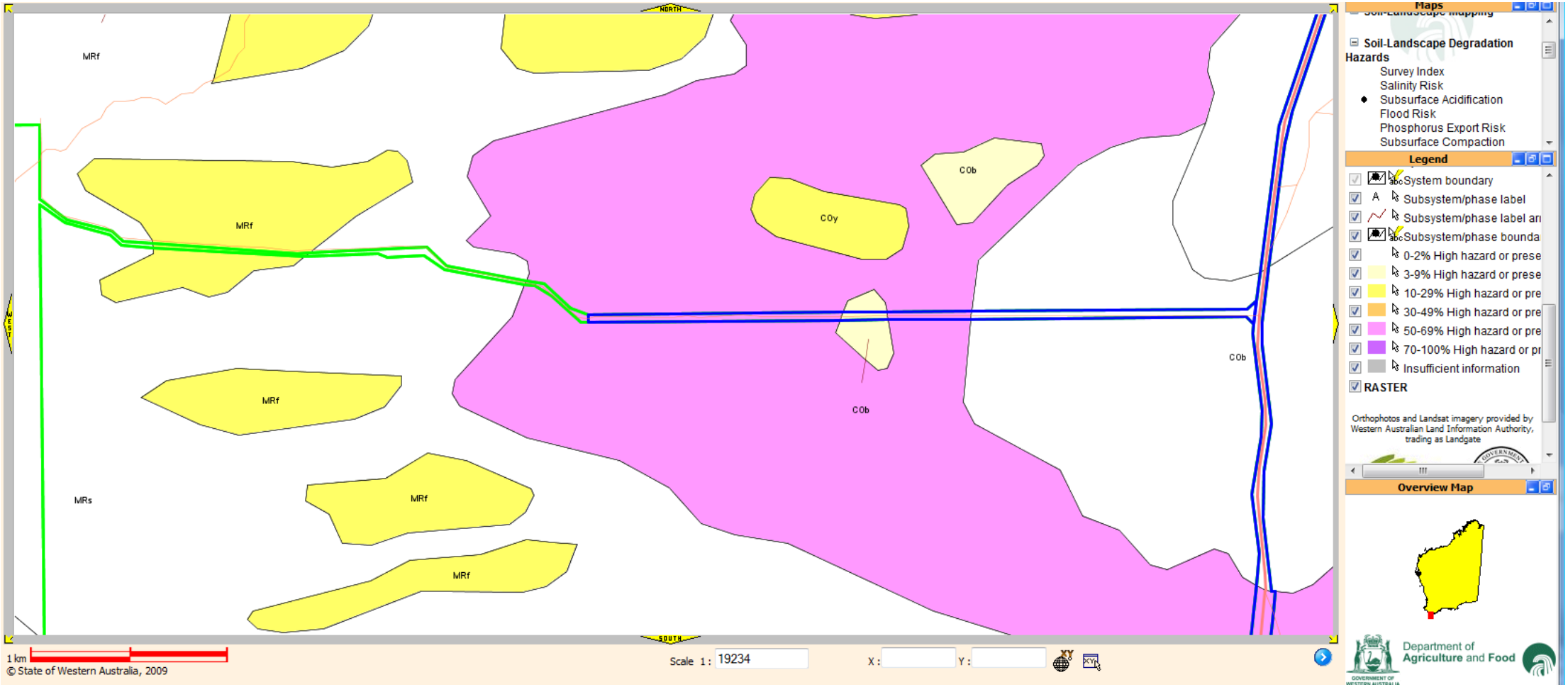
STATUS	FILE	DATE
FINAL	LAND001	20/9/2010

Appendix B

ASS Risk Mapping

Acid Sulfate Soil Risk Mapping

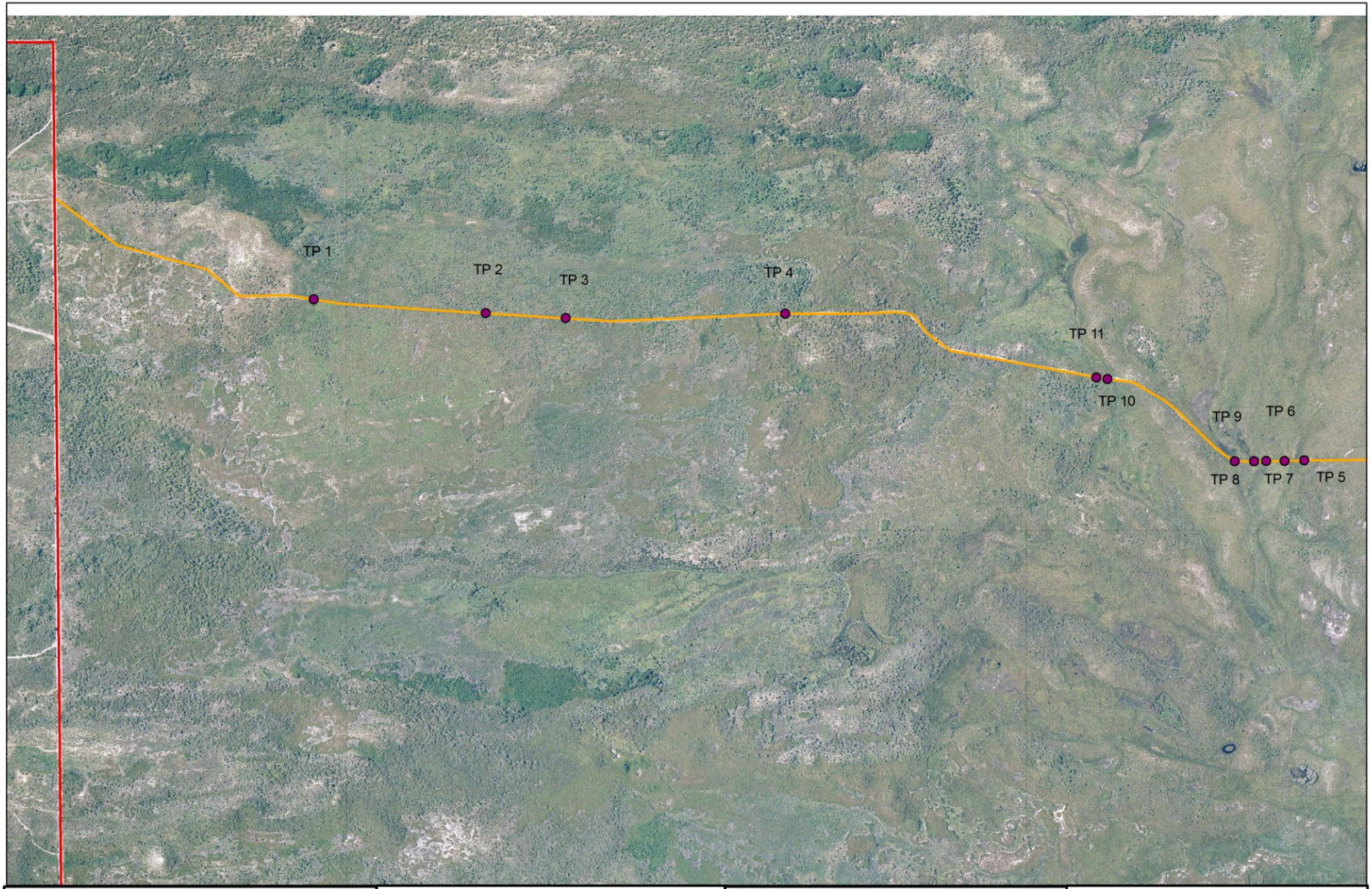
(SLIP Portal 2010)



Appendix C

Test Pits

Soil Profile Sampling



Legend

Nelson location 7965 — Road centreline

Windy harbour Road — Test Pit

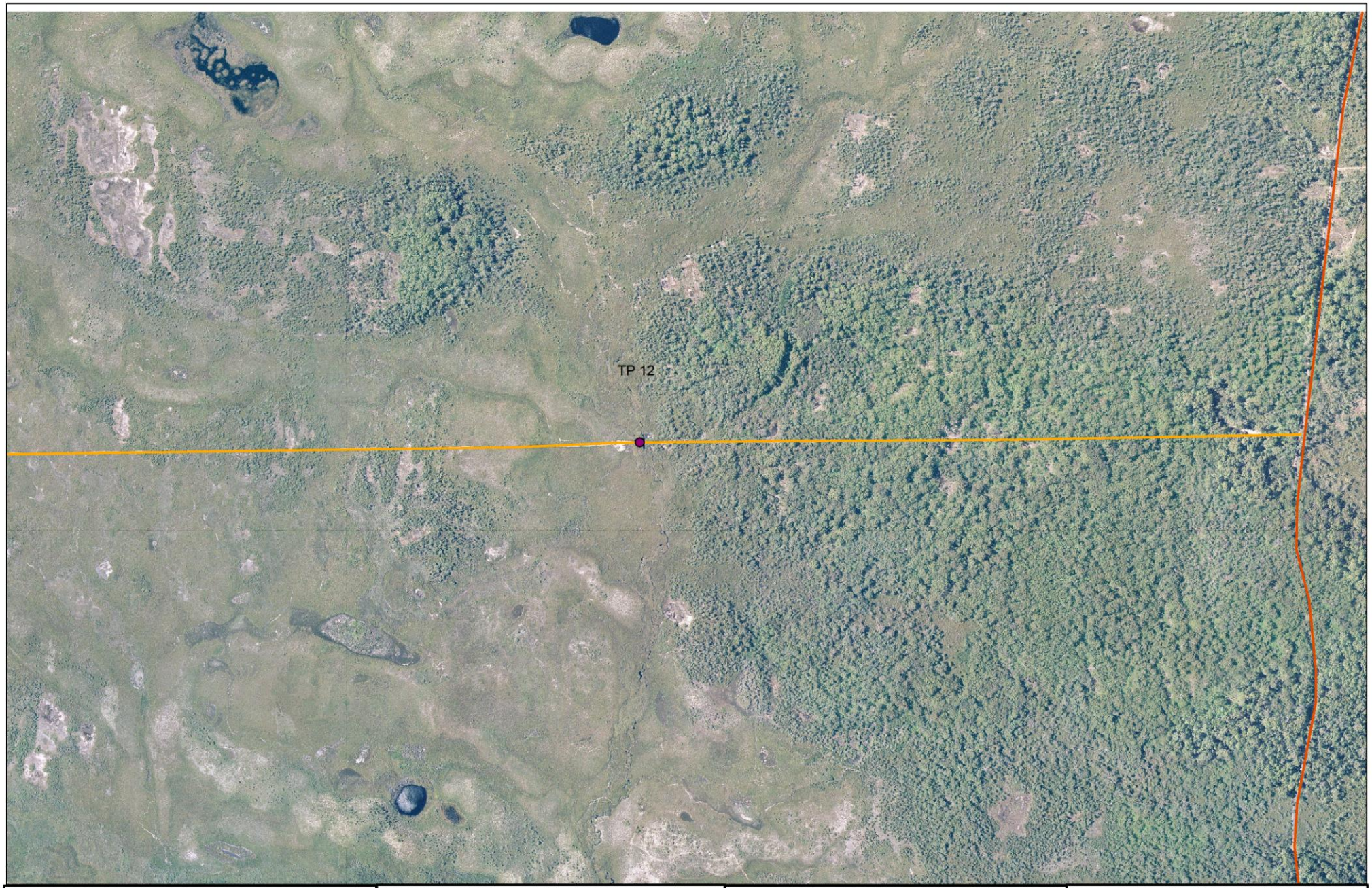
BIO DIVERSE SOLUTIONS

55 Peppermint Drive
Albany, WA 6330
Australia
Tel: 08 9841 3936
Fax: 08 9841 3936
Mob: 0447 555 516

CLIENT: Shellbay Holdings
Doggerup Road
Windy Harbour

ASS Test Pits

STATUS	FILE	DATE
Final	Land 001	09/03/2011



Legend

- Nelson location 7965
- Road centreline
- Windy harbour Road
- Test Pit

BIO DIVERSE SOLUTIONS
55 Peppermint Drive
Albany, WA 6330
Australia
Tel: 08 9841 3936
Fax: 08 9841 3936
Mob: 0447 555 516

CLIENT: Shellbay Holdings
Doggerup Road
Windy Harbour

ASS Test Pits

STATUS	FILE	DATE
Final	Land 001	09/03/2011

Soil Profile Sampling

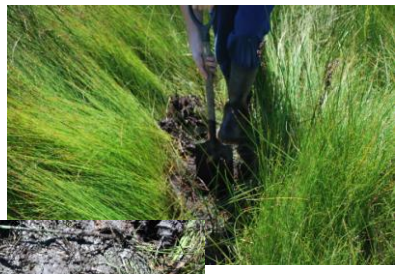
Location: Doggerup Road, Windy Harbour

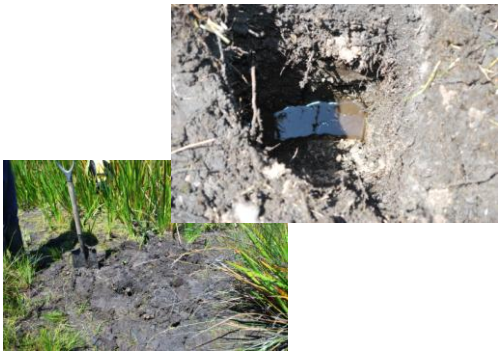
Date tested: 03/02/2011

Sampled by: Kath Kinnear

Weather: 25° sunny, wind easterly 15km/h

Location GPS	Site description	Sample and Depth(mm)	Soil description	Site Photographs
Loc 1 0409755 6150098	Adjacent to Habitat Tree #10 Juniperina	S1 - 150 S2 - 250	Grey sand Grey sand	
Loc 2 0410155 6150098	Adjacent to Habitat Tree Habitat #18 Banksia	S1 - 150 S2 - 250	Grey sand Grey sand	
Loc 3 0410341 6150060	Adjacent to Habitat Tree Habitat #23 Banksia	S1 - 150 S2 - 250	Grey sand Grey sand	

Location GPS	Site description	Sample and Depth(mm)	Soil description	Site Photographs
Loc 4 0410852 6150067	Habitat #37	S1 - 150 S2 - 250	Dark grey sand Dark grey sand	
Loc 5 04122058 6149735	Eastern edge of wetland 2	S1 – 250 S2 - 500	Light brown sand, moist organic matter. Brown moist sand.	
Loc 6 0412012 6149726	In wetland 50m west of Loc 5	S1 - 250 S2 - 400	Dark brown peaty sand, wet. Dark grey wet sand, rootlets Water table 400mm Pool 5m², 10cm deep possible mud minnows spotted. Slight flow east to west.	 

Location GPS	Site description	Sample and Depth(mm)	Soil description	Site Photographs
Loc 7 0411969 6149729	Middle of wetland 2 (east)	S1 - 250 S2 - 400	Dark brown silty sandy peat, organic matter Dark brown/black silty peat, wet, organic matter. Water table 300mm Minnows sighted. 20 paces west, thick wet peat to500mm. surface flow north to sout.	
Loc 8 0411942 6149727	In mud hole	S1 - 250 S2 - 500	Dark brown silty sandy slop Dark brown silty sandy slop, organic matter. 10cm of water cover, clear flowing north to south.	
Loc 9 0557593 6120639	West end of wetland 2	S1 - 250 S2 - 500	Dark grey slightly wet sand, organic matter. Grey wet sand. Water table 500mm No open water.	
Loc 10 0411600 6149921	Wetland 3, 10m from east side	S1 - 250 S2 - 500	Brown wet peat Brown wet sand Water table 500mm No surface water in reeds. Deepest part 15cm, silt settled over sand. Minnows sighted. Running slowly north to south.	

Location GPS	Site description	Sample and Depth(mm)	Soil description	Site Photographs
Loc 11 0411575 6149922	West side of wetland 3	S1 - 250 S1 - 500	Wet dark brown sand Wet brown coarse sand No water table	
Loc 12 0413798 6149700	Wetland 1 Inundated area to west of creek crossing	S1 - 250 S2 - 500	Grey moist sand Dark grey moist sandy silt Water table 400mm	

Appendix D

Bioscience WA

Laboratory Analysis Report

BIOSCIENCE PTY LTD ABN 26 547 517 746
488 NICHOLSON ROAD, FORRESTDALE WA 6112
PO BOX 5466 CANNING VALE SOUTH WA 6155
PHONE (08) 9397 2446, FAX (08) 9397 2447
EMAIL bioscience@biosciencewa.com
WEB www.biosciencewa.com

ANALYSIS REPORT: 4th March 2011
CLIENT: BioDiverse Solutions
ANALYSIS REQUESTED: Acid Sulfate Soil analysis x20
SAMPLES: Received 10th February 2011

6 Sample	Field pH (pH_F)	Peroxide pH (pH_{FOX})	Δ pH	Peroxide Reaction	Total Sulphur (%)	Action Criteria Met	Total Carbon (%)
Test Pit 1, Sample 2	4.69	3.52	1.17	L	0.065	1/5 NASS	3.873
Test Pit 1, Sample 2 H10	4.25	2.06	2.19	L	0.023	2/5 NASS	1.809
Test Pit 2, Sample 2	5.57	2.97	2.60	L	0.009	2/5 NASS	0.7397
Test Pit 3, Sample 2	6.24	4.51	1.73	L	0.027	0/5 NASS	1.025
Test Pit 4, Sample 2	5.01	3.56	1.45	L	0.032	1/5 NASS	3.003
Test Pit 5, Sample 1	4.47	3.08	1.39	L	0.008	0/5 NASS	0.7453
Test Pit 5, Sample 2	4.38	3.40	0.98	L	0.021	0/5 NASS	0.3739
Test Pit 6, Sample 1	4.84	2.98	1.86	L	0.053	2/5 PASS	4.225
Test Pit 6, Sample 2	5.00	2.73	2.27	L	0.042	3/5 PASS	3.551
Test Pit 7, Sample 1	4.98	3.30	1.68	L	0.13	1/5 NASS	7.658
Test Pit 7, Sample 2	5.00	2.17	2.83	L	0.12	3/5 PASS	5.340
Test Pit 8, Sample 1	5.00	2.69	2.31	L	0.22	3/5 PASS	20.47
Test Pit 8, Sample 2	5.22	2.74	2.48	L	0.39	3/5 PASS	23.38
Test Pit 9, Sample 1	6.63	5.57	1.06	L	0.026	0/5 NASS	0.8524
Test Pit 9, Sample 2	6.19	4.59	1.60	L	0.018	0/5 NASS	0.4784
Test Pit 10, Sample 1	5.61	3.69	1.92	L	0.55	1/5 NASS	51.74
Test Pit 10, Sample 2	5.76	3.40	2.36	L	0.014	1/5 NASS	0.4076
Test Pit 11, Sample 1	5.65	4.39	1.26	L	0.067	1/5 NASS	1.128
Test Pit 11, Sample 2	5.72	4.40	1.32	L	0.083	1/5 NASS	1.692
Test Pit 12, Sample 1	4.30	2.14	2.16	L	0.041	3/5 PASS	2.231

Samples were analysed according to DEC protocols for field tests, and for total carbon and sulphur by Leco induction furnace.

Interpretation
Actual Acid Sulfate Soils (AASS) have a field pH less than 4. None of the samples have so low a pH, so none are Actual Acid Sulfate.

Potential Acid Sulfate Soils (PASS) are indicated by exhibiting reduced sulphur at greater than 0.03% if a sand, or greater than 0.06% if a sandy clay and by also demonstrating at least one of the following:

- Oxidised pH of less than 3,
- pH reduction of more than 2 units when exposed to 30% hydrogen peroxide,
- moderate or higher reaction to peroxide.

Sandy Actual or Potential Acid Sulfate Soils have a reduced sulphur content of greater than 0.03% before management issues emerge. Bioscience measured the total sulphur content. If total sulphur is less than the reduced sulphur threshold, the soil cannot possibly be Acid Sulfate.

Six samples, Test Pit 6 Sample 1, Test Pit 6 Sample 2, Test Pit 7 Sample 2, Test Pit 8 Sample 1, Test Pit 8 Sample 2 and Test Pit 12 Sample 1 met PASS criteria, including sulphur levels in the exclusion analysis.

Appendix 5

Wetland Assessment Report

Natural Area Consulting 2011

Shellbay Holdings Pty Ltd

Wetland Assessment
Doggerup Road Reserve

March 2011

99 C Lord Street
Whiteman
Ph: (08) 9209 2767
Fax: (08) 9209 2768
consulting@naturalarea.com.au

Shellbay Holdings Pty Ltd

Doggerup Road Wetland Assessment

March 2011

Report prepared for: Shellbay Holdings Pty Ltd
Report prepared by: Natural Area Consulting
99C Lord St
Whiteman, WA 6068
consulting@naturalarea.com.au

Disclaimer

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Any recommendations, opinions or findings stated in this report are based on circumstances and facts as they existed at the time NAC performed the work. Any changes in such circumstances and facts upon which this document is based may adversely affect any recommendations, opinions or findings contained in this document.

Document Control			
Document:	Doggerup Road Reserve Wetland Assessment		
File:	Shellbay Holdings Pty Ltd		
Version Date	Prepared by	Reviewed by	Approved by
Draft 1	Sue Brand	Kath Kinnear	
Draft 2	Sue Brand	Luke Summers Kath Kinnear	
Final	Sue Brand	Luke Summers	Luke Summers

Executive Summary

Natural Area Consulting was commissioned by Bio Diverse Solutions on behalf of Shellbay Holdings Pty Ltd to undertake a wetland assessment of wetland areas within the gazetted Doggerup Road reserve running from Wheatley Coast Road through to Sandy Peak as a component of a PER currently being prepared as part of the environmental approvals process. The reserve and associated wetlands are considered to be a part of the Doggerup Creek System, a wetland group listed in the Directory of Important Wetlands of Australia.

Visits to the site during October 2010 and February 2011 determined:

- The catchment for the wetland areas flows towards the south east and does not connect to Doggerup Creek;
- The wetlands are coloured, and have a number of similarities to other wetlands listed in the Directory of Important Wetlands in Australia;
- The wetlands are somewhat seasonal in nature, with their water extent contracting significantly during summer months;
- There is little open water, with almost the entire extent of the wetlands covered with various sedges and rushes;
- The lack of open water means that the presence of the Balston's Pygmy Perch (*Nannatherina balstoni*), which is listed as vulnerable under the *EPBC Act* 1999 (Cwlth) and as rare, likely to become extinct under the *Wildlife Conservation Act* 1950 (WA), is unlikely (Storey, Uni WA, 2010, Personal Communication);
- It is possible that the Black Striped Minnow (*Galaxiella nigrostriata*), a priority 3 species listed by the DEC may use the site (Storey, Uni WA, 2010, Personal Communication), however only a small number of fish (believed to be either the Salamander Fish or the Mud Minnow), one frog and tadpoles of an unknown frog species were observed in the wetland areas visited; and
- No rare or threatened wetland vegetation species or threatened ecological communities were found at the site during the flora survey carried out in October 2010.

Given that the road reserve is largely cleared at present, and taken in conjunction with the observations made during the site visits, it is expected that probable impacts associated with formalising the road are unlikely to be significant and can be effectively managed.

Table of Contents

List of Figures

1.0 Introduction

Natural Area Consulting was commissioned by Shellbay Holdings Pty Ltd via Bio Diverse Solutions to undertake an assessment of wetlands along the gazetted Doggerup Road reserve that runs through the western portion of D'entrecasteaux National Park. The assessment will contribute to the Public Environmental Review process to determine the environmental acceptability of constructing a 3 metre wide limestone all weather track within the nominated road reserve. It is understood that the road reserve was originally gazetted some 60+ years ago and that efforts to formalise the road to enable year round access to Nelson Location 7965 (Sandy Peak) by the owners has been ongoing since 1995 when an application was submitted to the Shire of Manjimup (Bio Diverse Solutions, 2010).

The assessment was primarily carried out in October 2010, at a time when water was still present in some of the larger wetland areas. It included consideration of:

- Presence, extent and condition of wetland vegetation,
- Wetland catchment area(s),
- Landform and soils, and
- Presence of fauna.

2.0 Location

The site is located within the Shire of Manjimup, south west of Perth. It is some 18 km south of Northcliffe and 4 km northwest of Windy Harbour, as shown in Figure 1. It is a gazetted road reserve running off Windy Harbour Road to the west towards the property known as Nelson Location 7965 (Sandy Peak) through a portion of D'entrecasteaux National Park, as seen in Figure 2.

Figure 1

Location—Doggerup Road Reserve

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Whiteman, WA, 6068
naturalareaconsulting.com.au
08 9209 2767

Client
Shellbay Holdings Pty Ltd

Created by: SCB
Checked by: LS
Drawing No.: 01
Date: November 2010
Imagery Source: Whereis.com

Natural Area Consulting
99C Lord St,
Whiteman, WA, 6068
naturalarea.consulting.com.au
08 9209 2767

Figure 2

Doggerup Road Reserve
- Aerial Image

Client
Shellbay Holdings Pty Ltd

N

Created by: SCB
Checked by: LS
Drawing No: 02
Date: November 2010
Imagery Source: Landgate

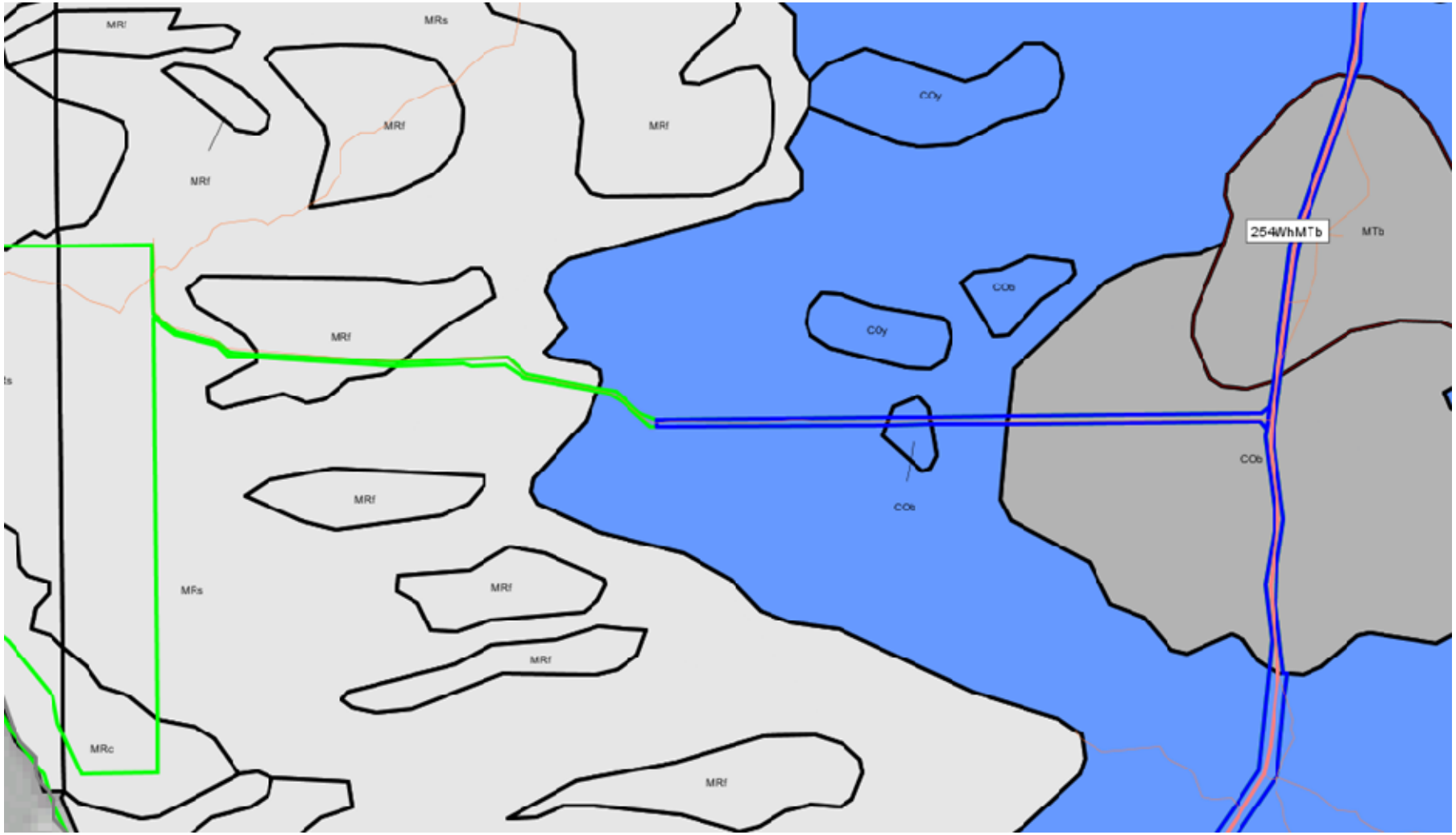
3.0 Geology, Soils and Landforms

The site is located within a portion of the Albany-Fraser Orogen, with granite and gneiss outcrops apparent adjacent to the road reserve and in nearby areas. Overlying the bedrock material are siliceous sands that have been deposited over time from marine and alluvial sources that contribute to the alluvial swampy belt associated with the broader Doggerup Creek System and at this site. Soil types found along the road reserve are described in Table 1.

Table 1: Soil Types along Doggerup Road Reserve

Map Unit	Name	Description
254BrCOb	Collis brown gravelly duplex	Low hills less than 20 m high on deeply weathered mantle over granitic rocks in the South Coast between Northcliffe and Torbay. Loamy gravels and Brown deep loamy duplexes. Marri-karri-jarrah forest.
254BrBWp	Blackwater podzols	Flat, poorly drained plain with some linear dunes and granite domes on unconsolidated sediments on granite and siltstone in the South Coast between Northcliffe and Denmark. Wet soils, Semi-wet soils and Pale deep sands. Mixed heath and sedgelands.
254WhCOb	Collis brown gravelly duplex	Low hills less than 20 m high on deeply weathered mantle over granitic rocks in the Southern Forests between Northcliffe and Torbay. Loamy gravels, Brown deep loamy duplexes and Duplex sandy gravels. Marri-karri-jarrah-tingle forest.
254NkMRf	Meerup podzols on interdunal plains	Interdunal flats on aeolian calcareous and siliceous sands over sediments and granite in the South Coast from the Yeagarup Dunes (Pemberton) to Torbay. Pale deep sands and some Semi wet soils. Yate-bullich-banksia-native cedar-paperbark woodland and thickets.
254NkMRs	Meerup podzols in silicaceous sand	Older, smooth rounded sand dunes on aeolian calcareous and siliceous sands over sediments and granite in the South Coast from the Warren River to Torbay. Pale deep sands. Marri-jarrah-bullich-yate-peppermint woodlands.

(Source: SLIPs NRM Portal, 2010, see also Figure 3)



Natural Area Consulting
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Figure 3

Doggerup Road Reserve - Geology

Client

Shellbay Holdings Pty Ltd

Legend

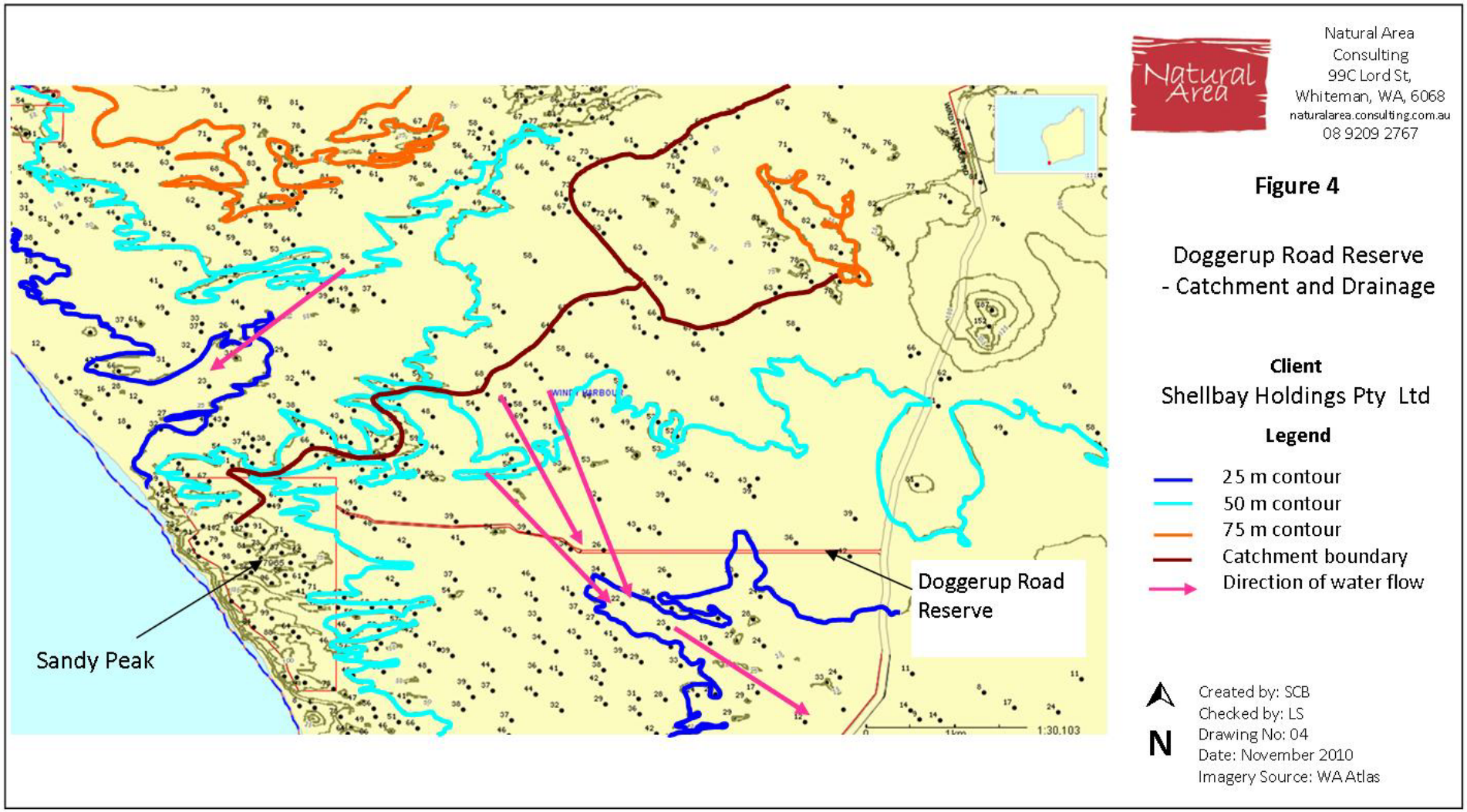
COb	Collis brown gravelly duplex
BWp	Blackwater podzol
MRf	Meerup podzols on interdunal plains
MRs	Meerup podzols in siliceous sands

N

Created by: SCB
Checked by: LS
Drawing No: 03
Date: November 2010
Imagery Source: SLIPs NRM Portal

4.0 Topography

The topography of the site ranges from dunes in the west, with flatter areas to the south and to the east. Contours range from 50 m around the dune areas, 40 m in the gravely duplex soils associated with the Karri forest and 25 m within the flatter areas in between where the wetland areas are located (refer Figure 4).


Sandy Peak
Doggerup Road Reserve
1:30,103
Natural Area Consulting
99C Lord St,
Whiteman, WA, 6068
naturalarea.consulting.com.au
08 9209 2767
Figure 4
Doggerup Road Reserve
- Catchment and Drainage
Client
Shellbay Holdings Pty Ltd
Legend
25 m contour
50 m contour
75 m contour
Catchment boundary
Direction of water flow
N
Created by: SCB
Checked by: LS
Drawing No: 04
Date: November 2010
Imagery Source: WA Atlas

5.0 Surface Hydrology

While 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) indicate the site is part of the broader Doggerup Creek System (ID WA104), further investigations reveal that the proposed track site is actually located within the Shannon River hydrographic catchment (Department of Fisheries, 2010), and within the local catchment of the Gardner River. Just 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 (refer Figures 4 and 5). 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. This is confirmed by mapping undertaken by the Department of Environment and Conservation (DEC) associated with delineating the Pemberton Western Shield Operational Boundary (refer Figure 6) (Department of Environment and Conservation, 2007). Other 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.

Figure 5: Dunes to the west and north of the road reserve act to direct water flow to the south and east, towards the Gardner River

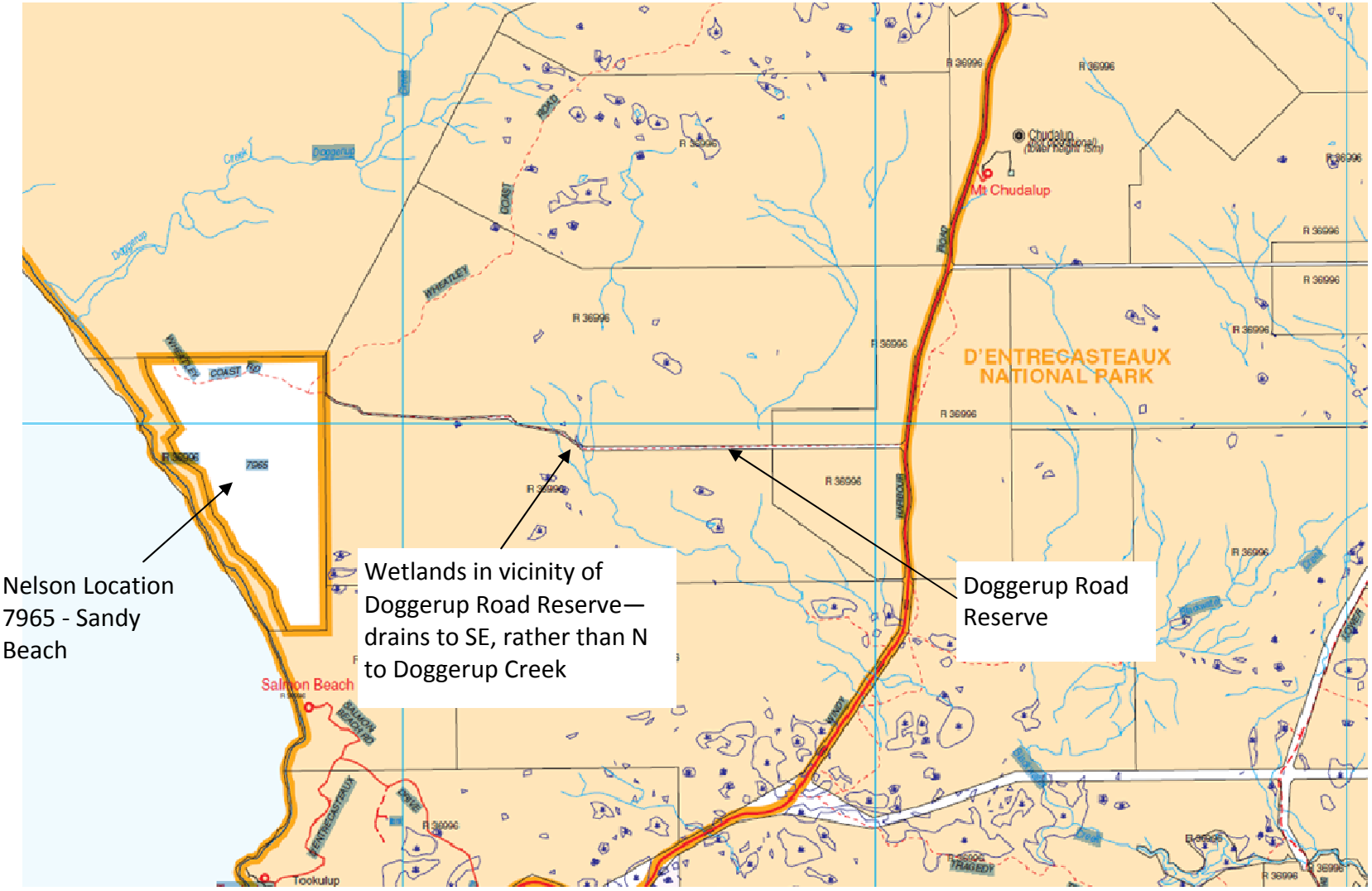


Figure 6

Extract from DEC Western Shield Boundary Map—Pemberton, in vicinity of Doggerup Road Reserve - Catchment and Drainage

Natural Area Consulting
99C Lord St,
Whiteman, WA, 6068
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Client
Shellbay Holdings Pty Ltd

N

Created by: SCB
Checked by: LS
Drawing No: 05
Date: November 2010
Imagery Source: DEC

6.0 Wetlands

6.1 Background Information

As indicated in the previous section, the Project site is described as being part of the 2550 ha Doggerup Creek System (Figure 7) 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

Of the six possible criteria for inclusion in the Directory of Important Wetlands, the Doggerup Creek System is considered to meet the following:

1	It is a good example of a wetland occurring within a Biogeographic region in Australia
2	It plays an important ecological or hydrological role in the natural functioning of a major wetland system or complex
3	It plays an important role as habitat for animal taxa at a vulnerable stage in their life cycle, or provides a refuge when adverse conditions such as drought prevail
4	It supports 1% or more of the national populations of any native plant or animal taxa
6	Is of outstanding historical or cultural significance

Figure 7

Extract from SLIPs NRM Portal showing Extent of Doggerup Creek Wetland System

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99C Lord St,
Whiteman, WA, 6068
naturalarea.consulting.com.au
08 9209 2767

Client
Shellbay Holdings Pty Ltd

N

Created by: SCB
Checked by: LS
Drawing No: 05
Date: November 2010
Imagery Source: SLIPs NRM Portal

6.2 Description of Wetlands on Site

While the wetlands in the vicinity of the Doggerup Road Reserve are recognised at State and Commonwealth as being within the broader Doggerup Creek System, they drain to the south east via the Blackwater Creek to the Gardner River and not to the Doggerup Creek in the north. 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^2 (0.17 ha) is within the road reserve with the potential for disturbance, or 1.3% of the wetland area.

The wetlands within the project site primarily occur over sandy soils with fine layers of organic material, as shown in Figure 8; however some peat is present within deeper portions of the large wetland areas (Figure 9). The water is very coloured due to the presence of tannins from vegetation and is consistent with other wetlands within the region.

Figure 8: Wetland base is sandy soils with fine layers of organic material

Figure 9: Peaty material in deeper wetland areas (Photo: K. Kinnear)

A number of wet areas within and around the Doggerup Road reserve area occur in depressions within the cleared road reserve (Figure 10). The creek line at the western end of the karri is known to have been modified by the Shire of Manjimup during road building activities some 30+ years ago (Bio Diverse Solutions, 2010). It is unknown whether other winter wet depressions within the road reserve are natural wetland areas or associated with the current presence and condition of the road reserve. It should be noted that the depressions generally include little or no vegetation and no fauna other than the occasional tadpole was observed.

Figure 10: Winter Wet Depression within Doggerup Road Reserve

A borrow pit adjacent to the road reserve near Windy Harbour Road has also become winter wet (Figure 11). At present, vegetation within the wet areas is primarily grasses with few sedges and rushes (Figure 12).

Figure 11: Winter Wet Borrow Pit

Figure 12: Inundated Grasses in Borrow Pit

The two larger wetland areas are best described as flooded meadows or sedge marshes fed by narrow creeks. They contain little or no open water, with sedges or rushes covering the majority of the wet areas (refer Figures 13, 14).

Figure 13: Grasses and sedges within wetland areas, showing little open water

Figure 14: Sedge marshes with little or no open water

6.3 Wetland Flora and Vegetation

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 (refer Figures 7, 12, and 13), rather what are considered to be dryland species, such as the Jarrah (*Eucalyptus marginata*) and Karri (*Eucalyptus diversicolor*). A flora and vegetation survey carried out by Natural Area Consulting (2011) at the same time as the wetland assessment identified a range of wetland species within the two larger wetland areas, including:

- A range of sedges and rushes:
  - *Baumea articulata*
  - *Baumea juncea*
  - *Evandra aristata*
  - *Meeboldina scariosa*
- Sedges, rushes and other damp area plants:
  - *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, 2011). While six (6) priority flora species were found during the survey (Natural Area Consulting, 2011), only the *Goodenia filiformis* (P3) was found in the vicinity of the wetland areas, with a small population found on the damp soils.

6.4 Wetland Fauna

6.4.1 Fish and Crustaceans

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* (Mud Minnow)
- *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 *Environmental Protection and Biodiversity Act* (1999) (Cwlth). The Black-striped Minnow is listed as a Priority 3 species under the *Wildlife Conservation Act* 1950 (WA), 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. While populations of the above have been recorded at various times (Department of Fisheries, 2010 (refer Figure 15); Department of Sustainability, Environment, Water, Population and Communities, 2010b), none have been found within the Project site.

The larger wetland areas in and around the gazetted Doggerup Road reserve are heavily vegetated, with water levels and quantities changing seasonally, contracting and drying during warmer months. Baltson's Pygmy Perch prefers permanently inundated creeks and wetlands, with areas of open water and is unlikely to become established in densely vegetated seasonal wetlands (Storey, Uni of WA, pers. comm., 2010). In addition, as the site is somewhat distant from any permanent water course or lake and the catchment flows to the Gardner River to the south east, the likelihood of it being used as a nursery area by juvenile fish in wetter years is probably low.

It is possible that the site provides suitable habitat for aestivating fish, such as the Salamander Fish (*Lepidogalaxias salamandroides*) the Black-striped Minnow (*Galaxiella nigrostriata*) and the Mud Minnow (*Galaxiella munda*). These species typically live in well vegetated, seasonal wetlands, where they are active during winter when water is present, and then aestivate (are dormant) in the sediments during the summer months (Storey, Uni of WA, 2010, pers. comm.). A visit to the site during February 2011 indicated a small number of fish in the wetland areas still containing water (<10 in total). These were believed to be either the Salamander Fish (*Lepidogalaxias salamandroides*) or the Mud Minnow (*Galaxiella munda*), with positive identification not possible at the time, and possibly two other species. A single frog of unknown species was also during the February 2011 visit.

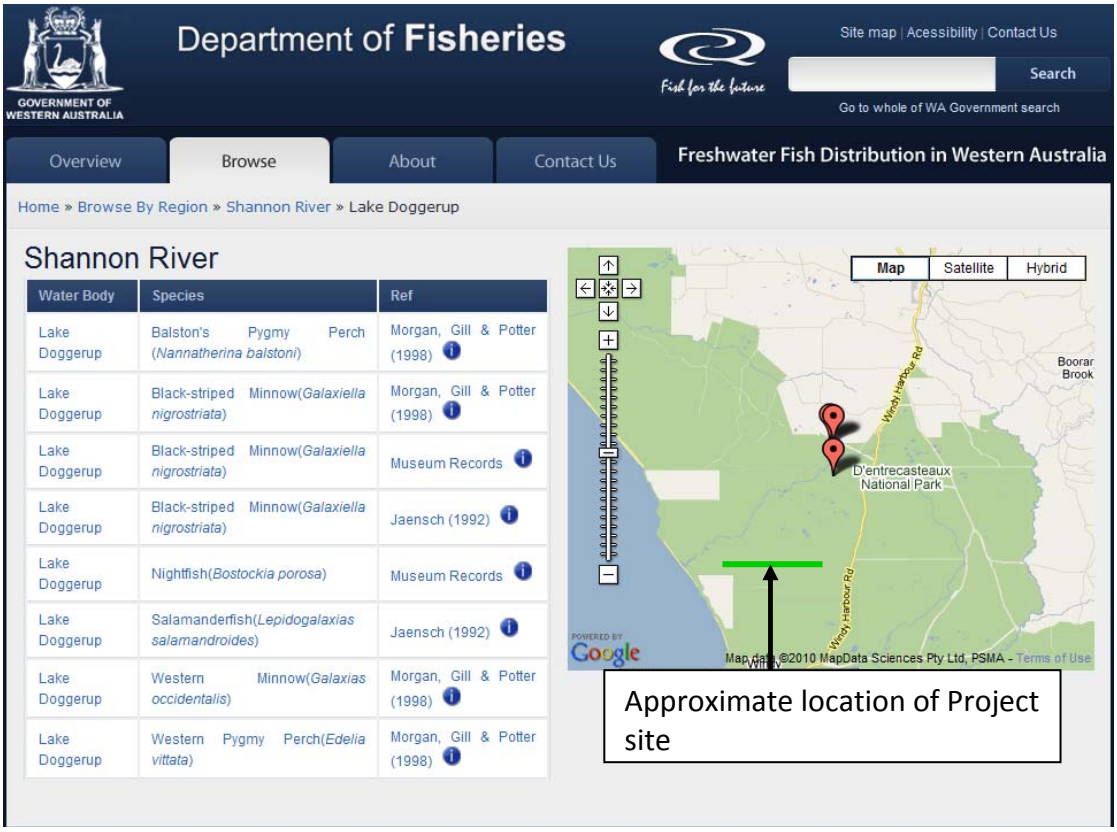

Figure 15: Freshwater Fish Distribution in Lake Doggerup
(Source: Department of Fisheries, 2010)

The Gilgie (*Cherax* sp.) is also known to be found at the site, as suggested by the presence of a burrow in damp sand and a claw found during the October visit to the site. Gilgies were observed during the February visit, however it is unknown which species they were.

6.4.2 Birds

A review of the Environmental Reporting Tool (Department of Sustainability, Environment, Water, Population and Communities, 2010a), indicates that

- there is the potential for the Forest Red-Tailed Black Cockatoo (*Calyptorhynchus banksii naso*) and the Baudin's Black Cockatoo (*Calyptorhynchus baudinii*), both of which are listed as 'vulnerable' under the EPBC Act 1999 (Cwlth), and the Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*) which is listed as 'critically endangered' may have habitat within the area, however there is no plant species used as a food source or for nesting hollows by these birds within the wetland areas of the Project site and immediate surrounds.
- 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.
- Other species listed are marine species and are not likely to be found within the Project area.

6.4.3 Project Site Observations

Visits to the site during October 2010 and February 2011 indicated the following:

- a small number of fish (believed to be either the Salamander Fish (*Lepidogalaxias salamandroides)* or the Mud Minnow (*Galaxiella munda*),were noticed in the larger wetland areas still containing water during February,
- a low number (< 5) of tadpoles were observed in a small, open pond approx. 3 cm deep along the gazetted Doggerup Road during the October visit, however it is not known which frog species they are a life stage of,
- one frog of unknown species was observed,
- in both the larger wetland areas, varying frog calls were apparent, indicating an ecosystem suitable for a number of species, however it is not know what species they were,
- frogs feed on insects and benthic wetland fauna, both of which exist within the wetland areas,
- evidence of the Gilgie was noted during the October visit, with animals observed during February,
- no birds or other larger fauna species were apparent within the wetland areas, and
- no wetland bird species were noted during the site visit, with the significant presence of sedges and rushes and lack of open water (refer Figures 13, 14) possibly acting as a deterrent.

6.5 Comparison with Nearby Wetlands

In order to assess the potential degree of impact that may to occur to the wetlands at the site if the Project proceeds, it is necessary to make some judgement about how similar or different they are to other wetland areas within the immediate vicinity and from locations a bit further afield. Both will be considered in this section.

6.5.1 Wetlands within the Immediate Vicinity

Areas that can be described as wetlands within the immediate vicinity were noted adjacent to Windy Harbour Road to the south of Doggerup Road reserve (refer Figures 16 and 17). It is not known if the areas are borrow pits associated with the road construction or were naturally subject to seasonal inundation prior to the construction of the road. Similarities to the Doggerup Road reserve wetland locations include:

- similar heath-type vegetation and typical wetland species,
- brown coloured water from tannins associated with the presence of native vegetation,
- sandy soils, and
- little or no aquatic fauna was apparent at any of the wet areas accessed.

Figure 16: Wet area to west of Windy Harbour Road

Figure 17: Wet area to east of Windy Harbour Road

6.5.2 Wetlands Listed in Directory of Important Wetlands

The Directory of Important Wetlands lists five other wetland areas that have some similar features to the Doggerup Creek System (ID WA104), these being:

- portions of the Broke Inlet System (ID WA102)
- Gingilup-Jasper wetland system (ID WA105)
- Maringup Lake (ID WA106)
- Mt Soho Swamps (ID WA107)
- Owingup Swamp system (ID WA108)

Information sheets for each of these wetland areas were reviewed and similarities to the broader Doggerup Creek system were identified, along with similarities to the wetlands found within the Doggerup Road reserve. It should be noted, however, that the review is limited to the information provided on the sheets only, where some flora and fauna species names are listed rather than definitive species lists. Key similarities are highlighted in Table 2. In summary, the Project site appears to be similar to these wetlands, with similarities including:

- wetland types
- geology,
- flora,
- fauna,
- water colour, and
- land tenure.

Table 2: Similarities to Wetlands Listed in the Directory of Important Wetlands

Doggerup Road Reserve	Doggerup Creek System WA104	Broke Inlet WA102	Gingilup-Jasper Wetland System WA105	Maringup Lake WA106	Mt Soho Swamps WA107	Owingup Swamp System WA108
34°789' – 34°791' S 116°034' – 116° 037' E	34° 42' – 34° 47' S, 115° 58' – 116° 06' E	34° 30' – 34° 57' S, 116° 21' – 116° 31' E	34° 20' – 34° 26' S, 115° 28' – 115° 44' E	34° 50' S, 116° 12' E	34° 47' S, 116° 57' E	34° 42' – 34° 47' S, 115° 58' – 116° 06' E
Creeks, swamps	Flats, swamps, lakes, creek, sumplands, floodplain, palusplains	Inlet, sumplands and rivers	Lakes, swamps	Lake and swamps	Swamps	Lakes and swamps
13 ha (approx.)	2550 ha (approx.)	4800 ha + rivers	1600 ha	286 ha	50 ha (approx.)	930 ha +
Wetland types: **B1, B10**	Wetland types: *B1*, **B2**, B4, *B5*, **B10**, *B15*	Wetland types: *B1*, **B2**, **B10,** *B15*	Wetland types: *B5*, **B10**, *B15*	Wetland types: *B5, B15*	Wetland type: *B15*	Wetland types: *B1, B5*, **B10**
As for Doggerup Creek System	Inclusion criteria: 1, 2, 3, 4, 6	Inclusion criteria: 1, 2, 3, 6	Inclusion criteria: 1, 2, 3, 4, 6	Inclusion criteria: 1, 2, 4, 6	Inclusion criteria: 4, 6	Inclusion criteria: 1, 2, 3, 4, 6
As for Doggerup Creek System	Albany-Fraser Orogen, low sandy hills, granite outcrops, sandy soils, sandy peat soils in waterlogged areas	Albany-Fraser Orogen, edge of Yilgarn Craton, sandy dunes, sandy soils, peat up to 1 m in small lakes	Perth Basin, sand dunes, sandy lake beds with organic sediments and peat in some locations	Albany-Fraser Orogen, grey quartz sand, granite outcrops, sand dunes, grey sands, peat and peaty sands in lake bed	Albany-Fraser Orogen, white sands, black organic substrate in swamps	Albany-Fraser Orogen, coastal dunes, sandy lake bottom, muddy under sedgelands
Fed by stream flow from sand dunes and probably groundwater	Fed by inflow and groundwater	Stream flow	Creek inflow and groundwater	Creek inflow and groundwater	Localised surface runoff, creeks	River inflow and groundwater
Shallow – up to 30 cm	Depth of swamps shallow (0.5 – 1.0 m)	Unknown	Probably 0.5 – 1.0 m	Unknown for swamps	Unknown for swamps	Unknown for swamps
Water colour brown - black	Water colour brown - black	Water colour in small lakes brown to black	Not recorded for swamps, lakes none, brown or black	Water colour none	Pooled water deeply stained	Water colour brown at Owingup Swamp
Flora species include: *Acacia cyclops* *Aotus intermedia* ***Banksia ilicifolia***	Flora species include: ***Agonis juniperina*** ***Agonis linearifolia*** *Baumea preissii* *Baumea riparia*	Flora species include: *Adenanthos detmoldii* *Agonis floribunda* ***Agonis juniperina*** *Banksia*	Flora species include: *Adenanthos detmoldii* *Agonis floribunda* ***Agonis linearifolia*** *Astartea sp Scott River*	Flora species include: ***Agonis juniperina*** ***Baumea articulata*** ***Baumea vaginalis***	Flora species include: ***Agonis linearifolia*** *Allocasuarina* *Baeckea arbuscula* *Banksia attenuata*	Flora species include: ***Agonis juniperina*** ***Agonis linearifolia*** *Astartea fascicularis* *Banksia littoralis*

Doggerup Road Reserve	Doggerup Creek System WA104	Broke Inlet WA102	Gingilup-Jasper Wetland System WA105	Maringup Lake WA106	Mt Soho Swamps WA107	Owingup Swamp System WA108
Banksia littoralis *Banksia quercifolia* ***Baumea articulata*** *Baumea juncea* *Baumea preissii* ***Baumea vaginalis*** ***Beaufortia sparsa*** *Eutaxia myrtifolia* ***Ghania trifida*** *Kunzea sulphurea* *Lepidosperma longitudinale* *Leucopogon cordatum* *Meeboldina roycei* *Melaleuca rhaphiophylla* ***Taxandria juniperina*** (previously known as *Agonis juniperina*)	***Baumea vaginalis*** ***Beaufortia sparsa*** ***Homalospermum firmum*** *Leptocarpus scariosus* *Restio applanatus* *Schoenus Sp.* *Triglochin procera* *Xyris lacera* *Villarsia lasiosperma*	*Baumea* ***Beaufortia sparsa*** *Eucalyptus* *Juncus kraussii* *Kennedia glabrata* *Leptocarpus* *Lomandra ordii* *Melaleuca* *Melaleuca cuticularis* *Reedia spathacea* *Restis jacksonii*	*Banksia littoralis* *Banksia meisneri var. ascedens* *Baeckea arbuscula* ***Baumea articulata*** ***Baumea vaginalis*** ***Beaufortia sparsa*** *Callistachys* *Evandra aristata* *Gahnia* *Gonocarpus hexandrus* *Gonocarpus pusillus* *Hypocalymma* *Jansonia formosa* *Kunzea ericifolia* *Lepidosperma* *Leptocarpus* *Melaleuca basicephala* *Melaleuca preissiana* *Restio* *lanceolata* *Restio cracens* *Xyris*		*Banksia ilicifolia* ***Banksia littoralis*** *Boronia* *Callistemon glaucus* *Cephalotus follicularis* *Empodisma gracillimum* *Eucalyptus calophylla* *Eucalyptus marginata* ***Homalospermum firmum*** *Melaleuca preissiana*	*Baumea arthrophylla* ***Baumea articulata*** ***Baumea vaginalis*** ***Beaufortia sparsa*** *Callistachys lanceolatum* *Diuris drummondii* ***Gahnia trifida*** *Melaleuca* *Typha orientalis*
Fish species: Probably *Galaxiella munda* ***Lepidogalaxias salamandroides*** (Species not confirmed)	Fish species include: *Bostockia porosa* *Edelia vittata* *Galaxias occidentalis* *Galaxiella munda* ***Galaxiella nigrostriata*** ***Lepidogalaxias salamandroides*** ***Nannatherina balstoni***	Fish species include: ***Galaxiella nigrostriata*** ***Lepidogalaxias salamandroides*** ***Nannatherina balstoni***	Fish species include: *Afurcagobius suppositus* ***Galaxiella nigrostriata*** ***Lepidogalaxias salamandroides*** ***Nannatherina balstoni*** *Pseudogobius olorum* *Tandanus bostocki*	Fish species include: *Atherinosoma wallacei* ***Nannatherina balstoni***	Fish species: no information provided	Fish species include: *Afurcagobius suppositus* *Galaxias maculatus* ***Galaxiella nigrostriata*** ***Nannatherina balstoni***
Invertebrates:	Invertebrates:	Invertebrates include:	Invertebrates include:	Invertebrates	Invertebrates include:	Invertebrates include:

Doggerup Road Reserve	Doggerup Creek System WA104	Broke Inlet WA102	Gingilup-Jasper Wetland System WA105	Maringup Lake WA106	Mt Soho Swamps WA107	Owingup Swamp System WA108
Cherax spp.	None named	***Cherax.*** spp	*Cherax tenuimanus*	include: *Cherax tenuimanus* *Cherax quinquecarinatus*	*Cherax crassimanus*	*Cherax plebejus* *Cherax quinquecarinatus* *Cherax destructor*
Tenure: road reserve with national park adjacent	Tenure: national park and freehold	Tenure: national park, shire reserve	Tenure: national park and nature reserve	Tenure: national park and freehold	Tenure: vacant crown land, water reserve, proposed addition to Frankland Mt Roe National Parks	Tenure: nature reserves
N/A	Compilation date: 1992, some revisions 1995 and 2000	Compilation date: 1992, some revisions 1995 and 2000	Compilation date: 1992, some revisions 1995 and 2000	Compilation date: 1992, some revisions 1995 and 2000	Compilation date: 1995, minor revision 2000	Compilation date: 1992, some revisions 1995 and 2000

Information sources:

- Doggerup Road Reserve: Personal observations, Natural Area Consulting, 2011, and Department of Sustainability, Environment, Water, Population and Communities, 2010b
- Doggerup Creek System: Department of Sustainability, Environment, Water, Population and Communities, 2010b
- Broke Inlet: Department of Sustainability, Environment, Water, Population and Communities, 2010c
- Gingilup-Jasper Wetland System: Department of Sustainability, Environment, Water, Population and Communities, 2010d
- Maringup Lake: Department of Sustainability, Environment, Water, Population and Communities, 2010e
- Mt Soho Swamps: Department of Sustainability, Environment, Water, Population and Communities, 2010f
- Owingup Swamp System: Department of Sustainability, Environment, Water, Population and Communities, 2010g

6.6 Potential Impacts and Management Strategies

Given that the proposed road construction will occur in the vicinity of a sensitive water resource, consideration will need to be given to the recommendations provided in Water Quality Protection Note 44 – Roads near Sensitive Water Resources (Department of Water, 2006). The information in Table 3 provides an indication of environmental factors that will need to be considered in the vicinity of the Doggerup Road reserve and offsite impacts to the Gardner River to the south east in the event approval is given for construction of the road.

Table 3: Environmental Considerations of Road Construction in Wetland Vicinity

Potential Impacts	WQPN 44 Recommendation(s)	Potential Management Strategies
• Clearing of vegetation	• Minimise clearing	• Road reserve currently gazetted • Area affected within 6.5 km length of road reserve is approximately 0.68 km, or 10.5% of the road reserve • Total Project area is approximately 13 ha, wetland areas cover approximately 1.4 ha, or 10.8% of the site. • Potential area of actual disturbance is 0.17 ha, or 1.3% of the road reserve site • Overall area affected within the broader Doggerup Creek System is 1.4 ha from a total 2550 ha, or 0.055% • Of this, the potential area of disturbance in 0.17 ha, or 0.007% of the Doggerup Creek System • Largely cleared at present, so reduced level of clearing will be required • No declared rare flora or fauna, threatened or priority ecological communities found in the vicinity of wetlands within the road reserve • Road is largely shaped already, however would need to confirmed by road construction engineers during design phase • Preparation of appropriate construction and operational management plans
• Increased potential for erosion and turbidity	• Minimise clearing • Retain or restore buffers • Design and locate to reduce potential	• Engineering design to take erosion and turbidity potential into consideration – e.g.: runoff into sumps prior to entering wetland areas

Potential Impacts	WQPN 44 Recommendation(s)	Potential Management Strategies
		• Minimise clearing • Number of vehicle movements expected to be very low because track will provide access to private property only • Regular inspections and maintenance as required during and after construction
• Chemical spills and similar from vehicles	• Road design, location of parking areas, and similar	• Unsealed 3 metre wide limestone all weather track planned • Road to provide access to owners property, so annual vehicle numbers and use by general public expected to be very low • Consider installation of 'No Through Road' sign(s) to deter general use of the track, • The installation of a gate could also be considered to prevent access by the general public
• Potential spread of dieback	• Give careful consideration of siting of road	• Undertake *Phytophthora* dieback assessment to determine whether or not the disease is present at the site • Avoid constructing road in dieback infected areas where possible • Use of crushed limestone planned for track construction, as its higher pH means it is very good at suppressing *Phytophthora* dieback (Dieback Working Group, undated)
• Interrupted flows within and between wetlands	• Construction to allow for uninterrupted flow	• Construction across the stream leaving the wetland area could be undertaken readily to avoid interruption to flows because of its narrow width • Installation of a 'floating road' comprising the installation of culvert pipes and road over the top designed to minimise interruption to flows and the need for clearing of wetland vegetation • Construction of batters can be consistent with those constructed in the vicinity of other wetlands • Preparation of appropriate construction and operational management plans
• Damage or destruction to fauna habitat	• Ensure no functional change occurs within	• Road is already gazetted and largely cleared already

Potential Impacts	WQPN 44 Recommendation(s)	Potential Management Strategies
	the wetland because of the road	• Design of track within wetland area will take into consideration current conditions, including the presence of vegetation and fauna • Retain or restore buffer between road and wetland areas • Minimise potential for contaminants to enter the wetland areas • Preparation of appropriate construction and operational management plans
• Decreased aesthetics	• Road should blend into natural environment where possible • Follow land contours to minimise extent of cut and fill required	• Unsealed 3 metre wide limestone all weather track proposed, so greater likelihood of blending into natural environment • Engineering design to minimise potential impacts
• Construction of roads in areas without due consideration of wetland values	• Public roads near sensitive water resources zoned by relevant government agency	• Road reserve currently gazetted
• Views of affected community members and stakeholders not taken into consideration	• Consultation required	• The proposed project is being assessed through Part IV of the Environmental Protection Act 1986 (WA), and will include a mandatory public consultation process • Discuss proposed project with local Department of Water officers because of wetland presence

7.0 Conclusion

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 Project 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.

8.0 References

Bio Diverse Solutions, (2010), *Environmental Scoping Document – Access Road to Nelson Location 7965 (Sandy Peak) Doggerup Road Shire of Manjimup*, unpublished report prepared for Shellbay Holdings Pty Ltd.

Department of Agriculture and Food, SLIPs NRM Portal, available World Wide Web URL: http://spatial.agric.wa.gov.au/slip/framesetup.asp, accessed 09 November 2010.

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 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, 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: 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.

Department of Sustainability, Environment, Water, Population and Communities, (2010g) *Directory of Important Wetlands – Owingup Swamp System – WA108*, available World Wide Web URL: http://www.environment.gov.au/cgi-bin/wetlands/report.pl, accessed 09 November 2010.

Department of Water, (2006), *Roads near Sensitive Water Resources, Water Quality Protection Note 44*, Department of Water, available World Wide Web URL: http://www.water.wa.gov.au/PublicationStore/first/81912.pdf, accessed 09 November 2010.

Dieback Working Group, (undated), *Management of Phytophthora Dieback in Extractive Industries – Best Practice Guidelines*, available World Wide Web URL: http://www.dwg.org.au/files/ExtractiveIndustry%20DiebackGuidelines.pdf, accessed 09 November 2010.

Environmental Protection and Biodiversity Conservation Act 1999 (Cwlth)

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

WA Atlas, available World Wide Web URL: https://uat2.landgate.wa.gov.au/bmvf/app/waatlas/, accessed 09 November 2010.

Wildlife Conservation Act 1950 (WA)

9.0 Glossary

DEC	Department of Environment and Conservation
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (previously Department of Environment, Water, Heritage and the Arts)
DoW	Department of Water
EIA	Environmental Impact Assessment
EPBC Act	Environmental Protection and Biodiversity Conservation Act (Cwlth)
NAC	Natural Area Consulting
PDWSA	Public drinking water source area
Podzol	Soil that is characterized by an upper dark organic zone overlying a white to gray zone formed by leaching, overlying a reddish-orange zone formed by the deposition of iron oxide, alumina, and organic matter. Podzols form in coniferous areas or under heath in cool, humid climates. (Source: http://www.thefreedictionary.com/podzol accessed 26 Oct 2010)

Appendix 6

Flora Survey

Natural Area Consulting August 2011

Shellbay Holdings Pty Ltd

Doggerup Road Reserve Flora Survey

August 2011

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Shellbay Holdings Pty Ltd

Doggerup Road Reserve
Flora Survey

August 2011

Report Prepared for: Shellbay Holdings Pty Ltd
Report Prepared by: Natural Area Consulting
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Document Control				
Document: Doggerup Road Flora Survey File: Shellbay Holdings				
Version Date	File	Prepared by (NAC)	Approved by (NAC)	Approved by Client (date)
Draft 1 Mar 11	Doggerup Road Flora Survey	Jacquie Milner	Sue Brand	
Final 21 March 2011	Doggerup Road Flora Survey	Jacquie Milner	Luke Summers	March 2011
Adjustments at request of OEPA August 2011	Doggerup Road Flora Survey	Jacquie Milner		

Table of Contents

1.0 INTRODUCTION

Natural Area Consulting was commissioned by Shellbay Holdings Pty Ltd via Bio Diverse Solutions to undertake an assessment of flora along the gazetted Doggerup Road reserve that runs through the western portion of D'Entrecasteaux National Park. The assessment will contribute to the Public Environmental Review process to determine the environmental acceptability of constructing a 3 metre wide limestone all weather track within the nominated road reserve.

1.1 Background

The Doggerup Road Reserve runs in an approximate east-west direction for 6.5 km between the Windy Harbour Road and Nelson Location 7965, about 4km north of the Windy Harbour settlement (Figure 1). It is understood that the road reserve was originally gazetted some 60+ years ago and that efforts to formalise the road to enable year round access to Nelson Location 7965 (Sandy Peak) by the owners has been ongoing since 1995, when an application was submitted to the Shire of Manjimup. The track route has been cleared in the past and allowed to regrow. The eastern portion of the track is still easily traversable in a vehicle but the western half is largely overgrown with even foot access difficult in some areas. There is no visible track route through the largest wetland in the middle of the survey area.

1.2 Scope of Appointment

To survey and record the flora occurring within 10 metres either side of the designated road route and to describe the vegetation units present within the survey area.

Figure 1

Location—Doggerup Road Reserve

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naturalareaconsulting.com.au
08 9209 2767

Client
Shellbay Holdings Pty Ltd

N

Created by: SCB
Checked by: LS
Drawing No.: 01
Date: November 2010
Imagery Source: Whereis.com

Natural Area Consulting
99C Lord St,
Whiteman, WA, 6068
naturalarea.consulting.com.au
08 9209 2767

Figure 2a

Doggerup Road Reserve
- Aerial Image (west)

Client
Shellbay Holdings Pty Ltd

N

Created by: SCB
Checked by: LS
Drawing No: 02
Date: November 2010
Imagery Source: Landgate

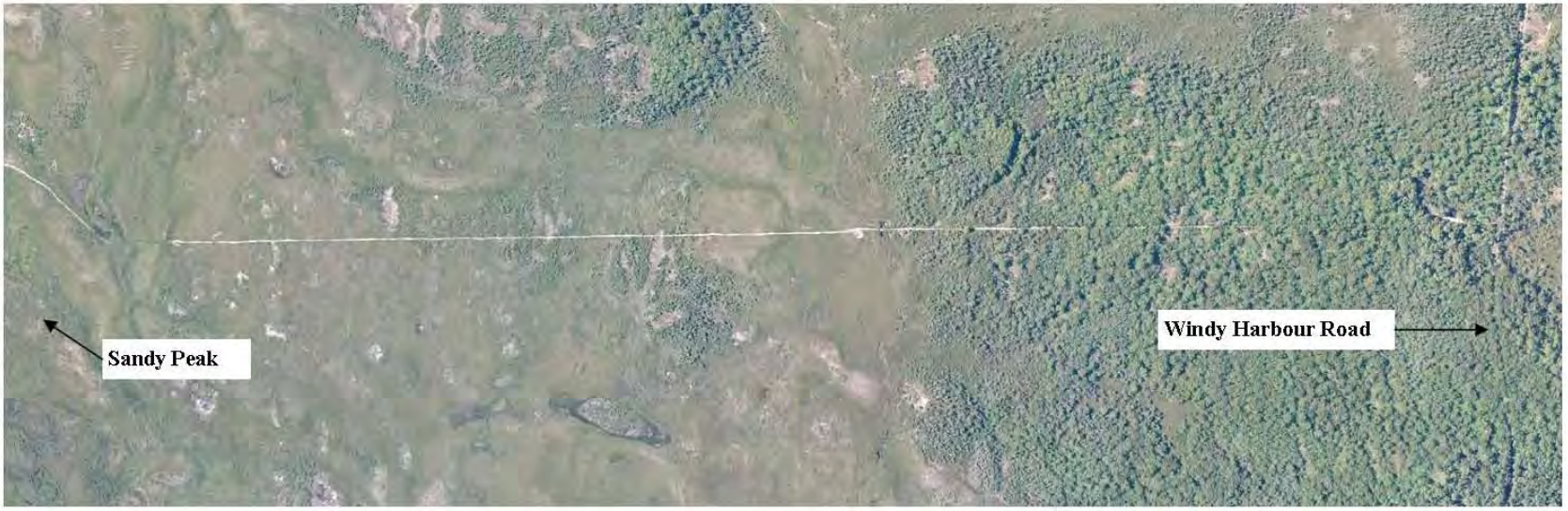

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Figure 2b

Doggerup Road Reserve
- Aerial Image (east)

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Checked by: LS
Drawing No: 02
Date: November 2010
Imagery Source: Landgate

2.0 EXISTING ENVIRONMENT

2.1 Regional context

The survey area is in the southern section of the Warren Sub-district, which is part of the Darling Botanical District, a division of the South West Botanical Provence (Beard, 1981).

2.2 Soils and Topography

A range of soils is found across the survey area. There are a number of old sand dunes that have well established vegetation on them with free-draining sandy soils in the western half of the survey area. The lower lying interdunal areas are poorly drained and are part of a broad slow-draining wetland area that drains to the Gardner River in the southeast. The soils are typically sandy loams. An area of exposed granite shelves are visible on the eastern side of the survey area, covered in shallow sandy soils and highlighted by stands of stunted Jarrah (*Eucalyptus marginata*) indicating the shallow nature of the soils over this granite. A higher area with stands of Karri (*Eucalyptus diversicolor*) indicates an area of brown loams on the eastern end of the survey area (Natural Area Consulting (NAC), 2011).

2.3 Climate

The survey area experiences a Mediterranean climate typical of the South West region of Western Australia with long dry summers and cool wet winters (Department of Conservation and Land Management (CALM), 1987). According to the Bureau of Meteorology (2010), the average rainfall in the area is 1300 mm, however this has dropped to around 1045 mm per annum over the last 20 years. The area experiences rainfall throughout the year due to its proximity to the coast, with the heaviest amounts generally occurring during the cooler months.

3.0 METHODOLOGY

3.1 Desktop survey

A request for rare flora information was made to DEC on 4th October, 2010. The Department's *Threatened (Declared Rare) Flora* database, the *Western Australian Herbarium Specimen* database and the Department's *Declared Rare and Priority Flora List* was searched. The results from the database searches showed that a total of 35 priority flora have been found within a 5 km radius of the study the area. Results of the database search are included in Appendix 5.

3.2 Field Survey

The initial field surveying of the area was undertaken over two days on October 20th and 21st, 2010. An additional visit for later flowering species was undertaken on February 2nd and 3rd, 2011 (Appendix 1).

A Botanist from Natural Area Consulting (NAC) was assisted in the field. The survey area was traversed on foot and a list of flora species present (native and exotic) was compiled as seen; samples or photographs were collected for unfamiliar species. Specimens collected were pressed, dried and identified. Specialist texts were used to identify specimens (Wheeler *et al*, 2002) with some checked against examples in the reference herbarium at the Western Australian Herbarium for confirmation. The authority for taxonomic names was DEC's FloraBase website as of February 2011.

The vegetation condition and vegetation units were assessed during the field survey in October. Structural classification from Bush Forever (Department of Environmental Protection, 2000) was used to describe the vegetation units. These were then compared with the Regional Forest Agreement Vegetation Complexes.

Vegetation condition was assessed using the vegetation condition scale after Keighery (1994) and as used for Bush Forever (Department of Environmental Protection, 2000) (Appendix 4). The levels of condition were marked over an aerial photograph after being sighted from the ground.

3.3 Limitations

Although the survey was undertaken at what is considered the optimal time of year for the south west botanical region of Western Australia, with a return visit during early February to following year to search for late flowering species, it is possible that some species of flora were not presenting at the time of the visits to the site.

4.0 RESULTS

4.1 Species Composition

A total of two hundred and thirty six (236) species were recorded in the Survey Area (Appendix 3). This included 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.

4.2 Declared Rare Flora and Priority Flora Species

No species of Declared Rare Flora were found in the Survey Area. Six priority plant species were found, as shown in Table 1. An estimate of the number of individual plants that are likely to be affected if the creation of the track proceeds is also provided in Table 1.

Table 1 | Priority plants located during flora survey

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

An explanation of the Conservation Codes can be found in Appendix 2.

A location for *Gonocarpus pusillus* was not accurately recorded and *Stylidium leeuwinense* was not in flower at the time of the survey (early February), despite efforts to time the visit during the described flowering period for this species. *Hemiandra australis* (Plate 1) had the largest presence, stretching over an old dune for about 100 metres. All other priority species found occupied small areas of only a few metres. Figures 3a and 3b show the approximate locations of the priority plants. The *Andersonia barbata* population appeared to be restricted to the previously disturbed area of the track, and the *Stylidium leeuwinense* population appeared to be restricted to the middle hump of the track, in between old tyre ruts. Accordingly, these species will be impacted as a result of clearing activities during track formalisation activities. 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.

PLATE 1

Hemiandra australis (P3)

During survey activities, various plant specimens were collected for later identification. Those species that were identified as being priority species, DRF, or otherwise significant were lodged with the Western Australian Herbarium. A total of eight specimens were lodged, of which six were priority flora species and two were considered to be range extensions. The collection numbers for the voucher specimens submitted to the Western Australian Herbarium are given in Appendix 6.

Threatened Flora Report Forms were completed to document sightings of the priority species found survey the survey. The forms have been lodged with the DEC, with copies provided in Appendix 7.

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.

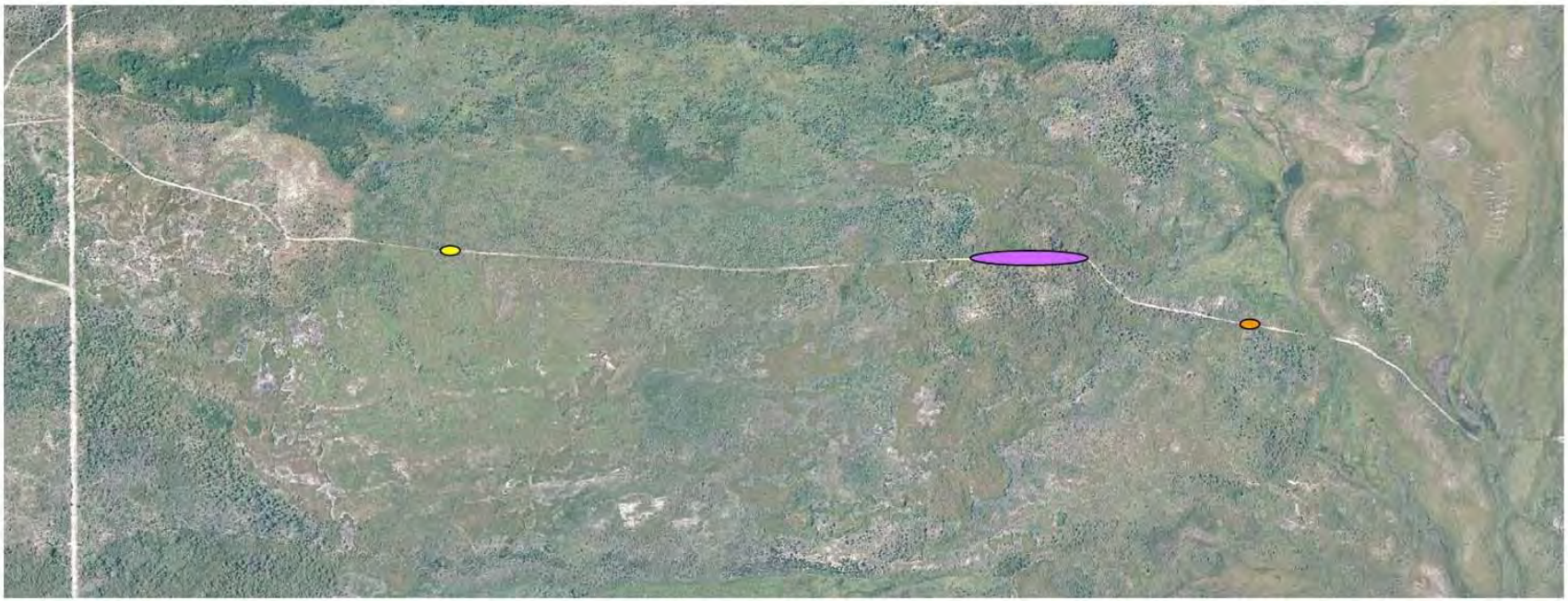

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Figure 3a

Doggerup Road Reserve
- Priority Plants (west)

Legend

- Hemiandra australis (P3)
- Goodenia filiformis (P3)
- Astartea sp. Scott River (P4)

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

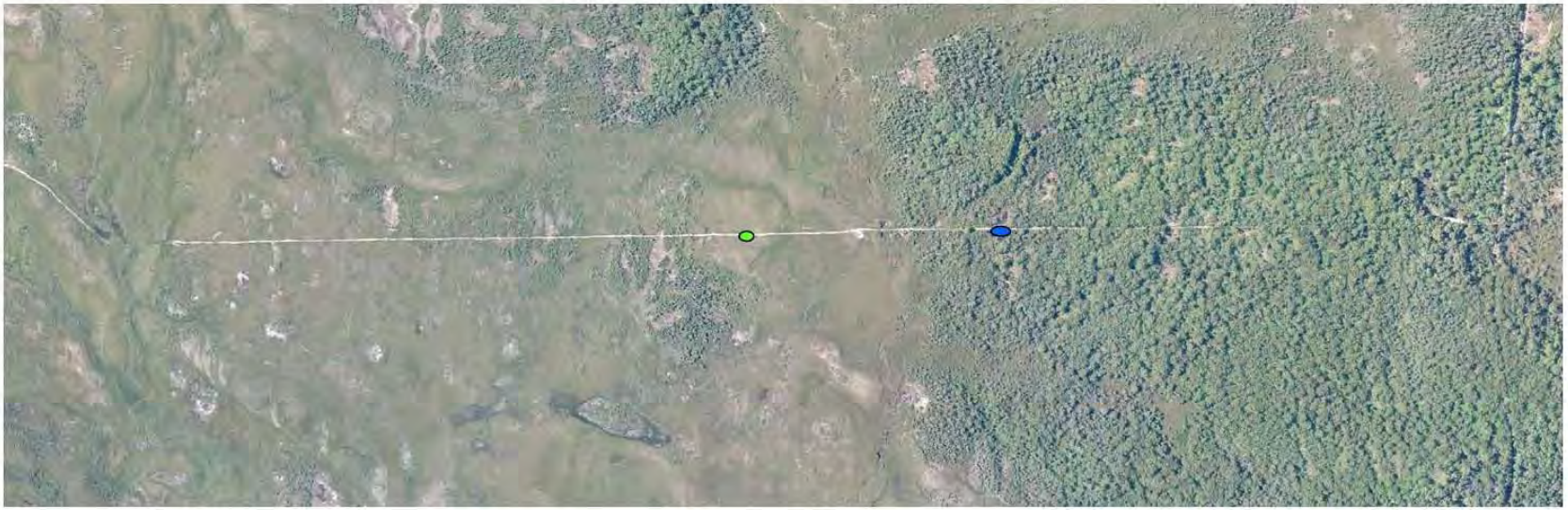

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Figure 3b

Doggerup Road Reserve
- Priority Plants (east)

Legend

- Stylidium leeuwinense (P3)
- Andersonia barbata (P2)

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

4.3 Flora of Significance

In addition to the Priority species of flora listed in Section 4.2 there are a number of other species that can be considered significant. Table 2 below summarises the species and their relative significance to the area.

Table 2: | Significant flora found within the Survey Area

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

Leucopogon rubricaulis and *Schoenus submicrostachyus* are both on the western side of their currently known ranges. Voucher specimens for each of these species have been lodged with the Western Australian Herbarium.

4.4 Weeds

Ten species of weeds were present, mainly concentrated in the area of Karri forest on the eastern side of the survey area, as shown in Table 3. None of these species could be considered to have a significant presence.

Table 3 | Weed Species Present in Survey Area

Species
Aira caryophylla
Briza minor
Centaurium erythraea
Euphorbia peplus
Hypochaeris glabra
Isolepis marginata
Lysimachia arvensis
Oxalis incarnata
Parentucella viscosa
Symphyotrichum squamatum

4.5 Vegetation Units

Seven vegetation units can be described within the survey area. A description of each unit is given in Table 4. A map displaying their ranges can be seen in Figures 4a and 4b. Additional photographs of some units can be found in Plate 2.

The described units have then been compared to the Regional Forest Agreement (RFA) Vegetation Complexes as described by Mattiske and Havel (1998). A map of the vegetation complexes in the vicinity of the survey area is displayed in Figure 4c. Four complexes are traversed by the survey area and the described units have been compared with the brief description of dominant species for each Vegetation Complex in Table 5. 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. An estimate of area traversed during the survey and potentially affected by clearing during the proposed track formalisation in each RFA Vegetation Complex was made and is presented in Table 6 (page 22). 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 (Table 6).

Table 4 | Vegetation Units

Unit	Unit Description		Comments
Ed	Tall Closed *Eucalyptus diversicolor* forest over low closed forest of *Allocasuarina decussata, Hovea elliptica, Chorilaena quercifolia* and *Trymalium floribundum.*		
EmCc	Tall Open Forest of *Eucalyptus marginata and Corymbia calophylla* over a Tall Open Scrub layer with *Acacia urophylla, Hibbertia cuneiformis, Hibbertia furfuracea, Sida hookeriana* and *various Thomasia* species.		Photo courtesy of K. Kinnear.

Unit	Unit Description		Comments
OH	Open Heath of *Anarthria scabrum, Adenanthos obovatus, Acacia pulchella, Acacia hastulata, Calothamnus lateralis, Cyathochaeta clandestina, Dasypogon bromeliifolia, Hakea ceratophylla, Patersonia occidentalis, Diaspasis filiformis* and *Meeboldina denmarkica.*		
Em	Low Woodland of stunted *Eucalyptus marginata* growing over granite with *Anarthria scabrum, Hakea florida, Hakea linearis, Persoonia graminea, Xanthorrhoea preissii, Dasypogon bromeliifolius, Banksia nivea* and *Andersonia sprengelioides*.		Photo courtesy of K. Kinnear.

Unit	Unit Description		Comments
CTS	Wetland areas with Closed Tall Scrub of *Homalospermum firmum, Rhadinothamnus anceps, Astartea laricifolia, Baumea articulata, Evandra aristata, Meeboldina scariosa, Melaleuca pauciflora, Acacia divergens, Patersonia occidentalis var. occidentalis* and *Hibbertia perfoliata*.		Closed Tall Scrub in the largest wetland area of the survey.
Tf	Old, established dunes with a Low Open Forest of *Taxandria flexuosa* and *Banksia ilicifolia* with and understorey of Tall Open Scrub of *Jacksonia horrida, Acacia Cyclops* and *Macrozamia reidlei*.		*Jacksonia horrida* Tall Open Scrub.

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

PLATE 2

Exposed granite area in *the Eucalyptus marginata* Low Woodland unit.

A recently burnt area of Open Heathland on the east side of the survey area.

Closed Tall Scrub area.

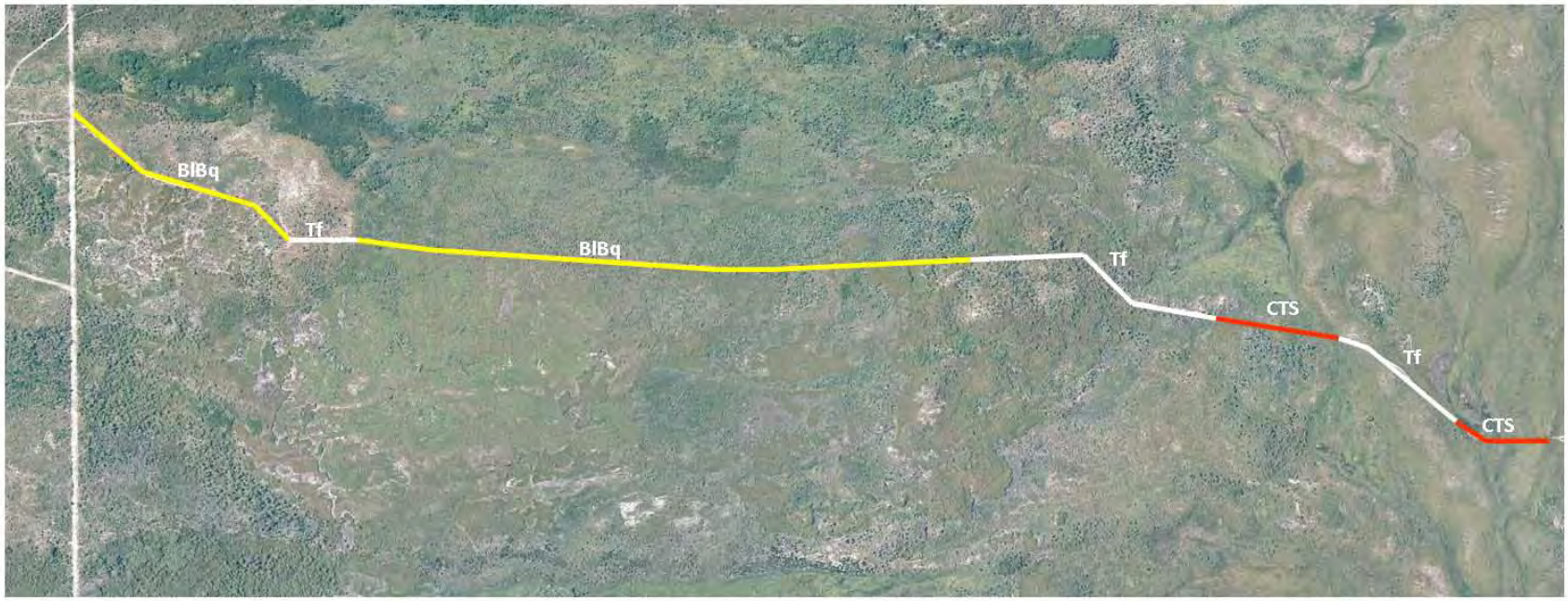

Figure 4a

Doggerup Road Reserve
- Vegetation Types (west)

Legend

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

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Drawing No: 02
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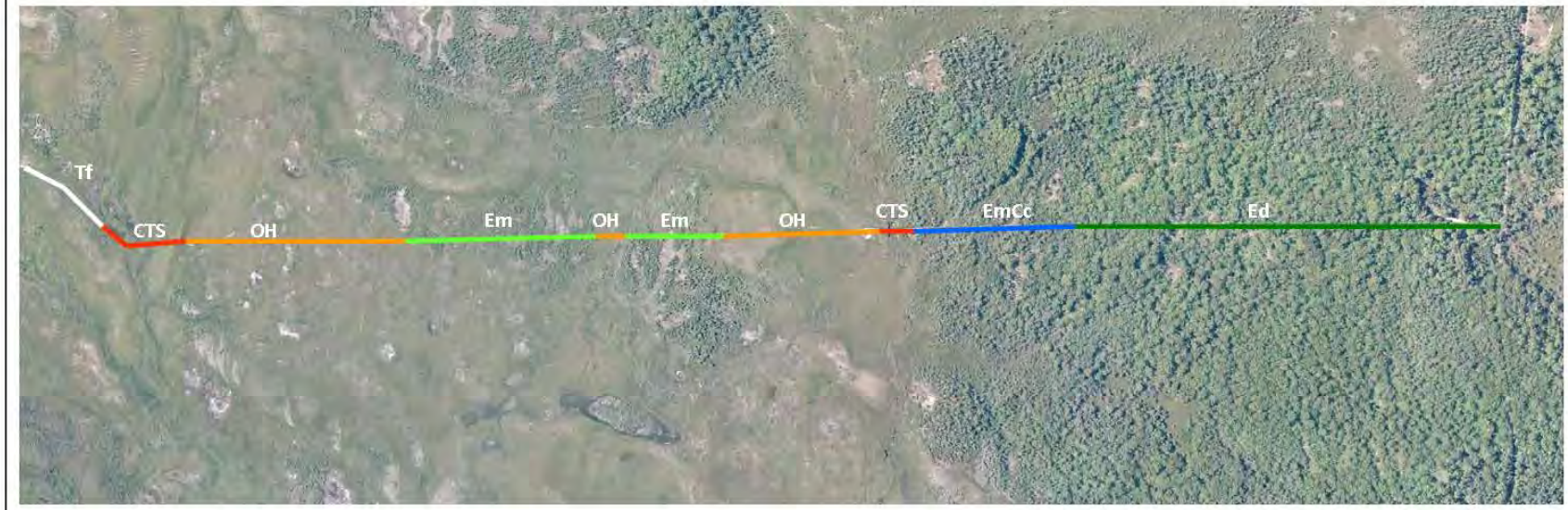

Legend

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

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Figure 4b

Doggerup Road Reserve
- Vegetation Types (east)

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Drawing No: 02
Date: February 2011
Imagery Source: Landgate

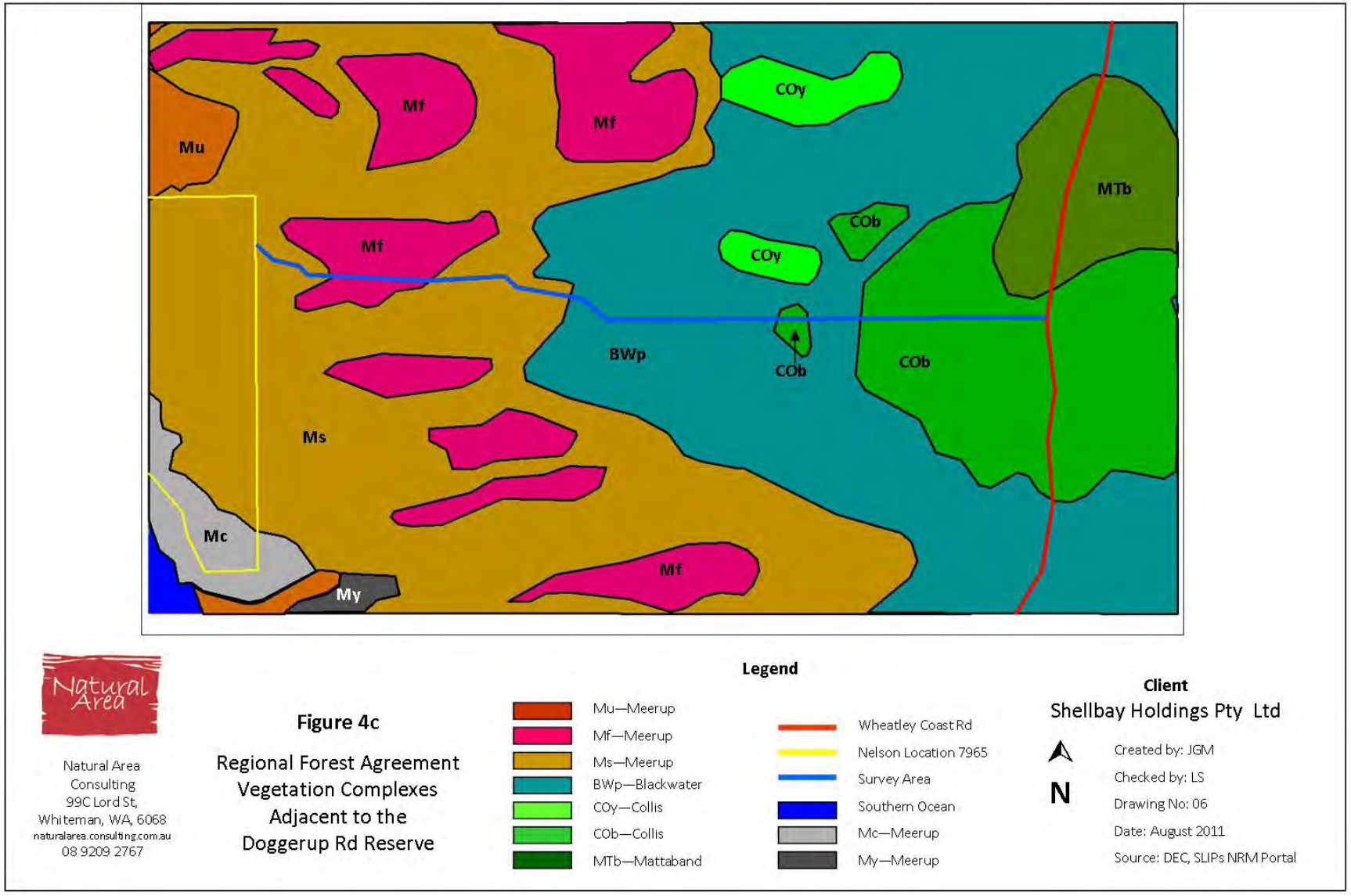
Mu
Mf
Mf
COy
MTb
COb
Mf
COy
BWp
COb
COb
Ms
Mc
Mf
My
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Figure 4c
Regional Forest Agreement Vegetation Complexes Adjacent to the Doggerup Rd Reserve
Legend
Mu—Meerup
Mf—Meerup
Ms—Meerup
BWp—Blackwater
COy—Collis
COb—Collis
MTb—Mattaband
Wheatley Coast Rd
Nelson Location 7965
Survey Area
Southern Ocean
Mc—Meerup
My—Meerup
Client
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N
Created by: JGM
Checked by: LS
Drawing No: 06
Date: August 2011
Source: DEC, SLIPs NRM Portal

Table 5 | Regional Forest Agreement Vegetation Complexes crossed by the Survey Area

Vegetation Complex	Soil description[1]	Associated vegetation[1]	Surveyed Vegetation Units
Collis brown gravelly duplex (COb)	Low hills less than 20 m high on deeply weathered mantle over granitic rocks in the South Coast between Northcliffe and Torbay. Loamy gravels and Brown deep loamy duplexes. Marri-karri-jarrah forest.	Marri-karri-jarrah tall open forest occurs with scattered *Banksia grandis, Allocasuarina decussata, Agonis flexuosa* and *Persoonia longifolia*, and a shrub layer of *Acacia pentadenia*, *Bossiaea linophylla, Bossiaea aquifolia, Chorilaena quercifolia, Chorizema ilicifolium* and *Hovea elliptica*. Jarrah-marri tall open forest occurs with scattered *Banksia grandis, Persoonia longifolia* and *Xylomelum occidentale*, and a dense shrub layer of *Bossiaea linophylla, Xanthosia rotundifolia*, *Acacia spp., Synaphea reticulata* and *Hakea spp*.; creepers include *Kennedia coccinea, Hardenbergia comptoniana* and *Cassytha glabella.*	**Ed:** Tall Closed *Eucalyptus diversicolor* forest over low closed forest of *Allocasuarina decussata, Hovea elliptica, Chorilaena quercifolia* and *Trymalium floribundum.* **EmCc:** Tall Open Forest of *Eucalyptus marginata and Corymbia calophylla* over a Tall Open Scrub layer with *Acacia urophylla, Hibbertia cuneiformis, Hibbertia furfuracea, Sida hookeriana* and *various Thomasia* species. **Em:** Low Woodland of stunted *Eucalyptus marginata* growing over granite with *Anarthria scabrum, Hakea florida, Hakea linearis, Persoonia graminea, Xanthorrhoea preissii, Dasypogon bromeliifolius, Banksia nivea* and *Andersonia sprengelioides*.
Black Water podzols (BWp)	Flat, poorly drained plain with some linear dunes and granite domes on unconsolidated sediments on granite and siltstone in the South Coast between Northcliffe and Denmark. Wet soils, Semi-wet soils and Pale deep sands. Mixed heath and sedgelands	Heath communities are extensive and comprise *Beaufortia sparsa, Pultenaea reticulata, Astartea fascicularis, Comesperma confertum, Kingia australis, Kunzea recurva* and *Homalospermum firmum*. There are also sedgelands of *Gahnia decomposita, Anarthria prolifera, Anarthria scabra, Evandra aristata, Diaspasis filifolia, Leptocarpus scariosus, Lysinema ciliatum* and *Scirpus nodosus*. Scattered *Nuytsia floribunda* and *Melaleuca preissiana* may occur. Dunes	**OH:** Open Heath of *Anarthria scabrum, Adenanthos obovatus, Acacia pulchella, Acacia hastulata, Calothamnus lateralis, Cyathochaeta clandestina, Dasypogon bromeliifolia, Hakea ceratophylla, Patersonia occidentalis, Diaspasis filiformis* and *Meeboldina denmarkica.* **CTS:** Wetland areas with Closed Tall

Vegetation Complex	Soil description[1]	Associated vegetation[1]	Surveyed Vegetation Units
		and hummocks have a woodland of *Banksia attenuata, B. ilicifolia, Allocasuarina fraseriana* and *Eucalyptus megacarpa*, and a dense shrub layer of *Adenanthos obovatus, Hypocalymma strictum, Jacksonia horrida, Xanthorrhoea preissii* and *Macrozamia riedlei*.	Scrub of *Homalospermum firmum, Rhadinothamnus anceps, Astartea laricifolia, Baumea articulata, Evandra aristata, Meeboldina scariosa, Melaleuca pauciflora, Acacia divergens, Patersonia occidentalis var. occidentalis* and *Hibbertia perfoliata*.
Meerup podzols on interdunal plains (Mf)	Interdunal flats on aeolian calcareous and siliceous sands over sediments and granite in the South Coast from the Yeagarup Dunes (Pemberton) to Torbay. Pale deep sands and some Semi wet soils. Yate-bullich-banksia-native cedar-paperbark woodland and thickets.	Woodlands occur and these comprise *Eucalyptus cornuta, E. megacarpa, Banksia littoralis* and *Agonis juniperina*, with a dense shrub layer of *Jacksonia furcellata, Anigozanthos flavidus, Leucopogon australis, Hibbertia montana* and *Lepidosperma longitudinale*; the parasitic creeper *Cassytha glabella* is common. There are woodlands and thickets of *Melaleuca preissiana, Banksia littoralis* and *Agonis juniperina* (Native Cedar). Some pockets of *Eucalyptus cornuta, E. megacarpa* and *Eucalyptus calophylla* occur. A dense shrub layer includes *Pultenaea reticulata and Leucopogon australis*.	**BlBq:** Low Open Woodland *of Banksia littoralis* and *Banksia quercifolia* with a Closed Tall Scrub understorey of *Kunzea sulphurea, Leucopogon cordatum, Melaleuca densa, Taxandria juniperina, Taxandria parviceps, Beaufortia sparsa, Eutaxia myrtifolia, Aotus intermedia, Meeboldina roycei and Lepidosperma longitudinale.*
Meerup podzols on siliceous sands (Ms)	Older, smooth rounded sand dunes on aeolian calcareous and siliceous sands over sediments and granite in the South Coast from the Warren River to Torbay. Pale deep sands. Marri-jarrah-bullich-yate-peppermint woodlands.	Woodlands are dominant and these comprise *Eucalyptus megacarpa, E. cornuta, Agonis flexuosa, Xylomelum occidentale, Banksia grandis, B. ilicifolia* and *Allocasuarina fraseriana*, with dense ground cover of *Acacia pulchella, Jacksonia furcellata, Melaleuca thymoides, Macrozamia riedlei and Pultenaea reticulata*. Woodlands of marri are dominant with jarrah, *Eucalyptus*	**Tf:** Old, established dunes with a Low Open Forest of *Taxandria flexuosa* and *Banksia ilicifolia* with and understorey of Tall Open Scrub of *Jacksonia horrida, Acacia Cyclops* and *Macrozamia reidlei*.

Vegetation Complex	Soil description[1]	Associated vegetation[1]	Surveyed Vegetation Units
		megacarpa (Bullich) and *E. cornuta* (Yate). *Agonis flexuosa* (Western Australian Peppermint), *Allocasuarina fraseriana, Banksia grandis, Leucopogon verticillatus* and *Persoonia longifolia* are important low tree species. A dense shrub layer includes *Macrozamia riedlei, Leucopogon australis, L. propinquus, Bossiaea linophylla, Hovea elliptica, Hibbertia stellaris* (Star Guinea Flower), *Hardenbergia comptoniana, Acacia pulchella, Xylomelum occidentale, Hakea oleifolia* and *Hybanthus spp*.	

1: Source: SLIPs NRM database (2011).

Table 6 | 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

4.6 Threatened and Priority Ecological Communities

No Threatened or Priority Ecological Communities were found within the survey area. The vegetation units described above in section 4.5 show no correlation with the ecological communities listed by the DEC's Species and Communities Branch (2010) for the Warren district.

4.7 Vegetation Condition

The vegetation condition was assessed along the gazetted Doggerup Road reserve and for 10 m either side. The vegetation condition within the road reserve area is primarily degraded because of the previous clearing that has occurred. Where there has been some regrowth, particularly along the western portions of the track, the condition of the vegetation present can be considered good (Figures 5a and 5b).

The vegetation condition of the flora on either side of the track can be considered to be excellent across the survey area. There were very few weeds present, with the majority of weed species concentrated in the section of Karri forest on the eastern side of the survey area and their presence was low. This area does see some occasional vehicle traffic from the Windy Harbour Road. A controlled burn had occurred (DEC Duty Officer, Manjimup Office, October 2010 pers. comm.) over part of the survey area within the previous 18 months (approximately) but regenerating growth was vigorous. Figures 5a and 5b also show the vegetation condition rating along the survey area outside of the cleared track.

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Figure 5a

Doggerup Road Reserve
- Vegetation Condition (west)

Legend

- Degraded
- Good
- Excellent

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Shellbay Holdings Pty Ltd

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

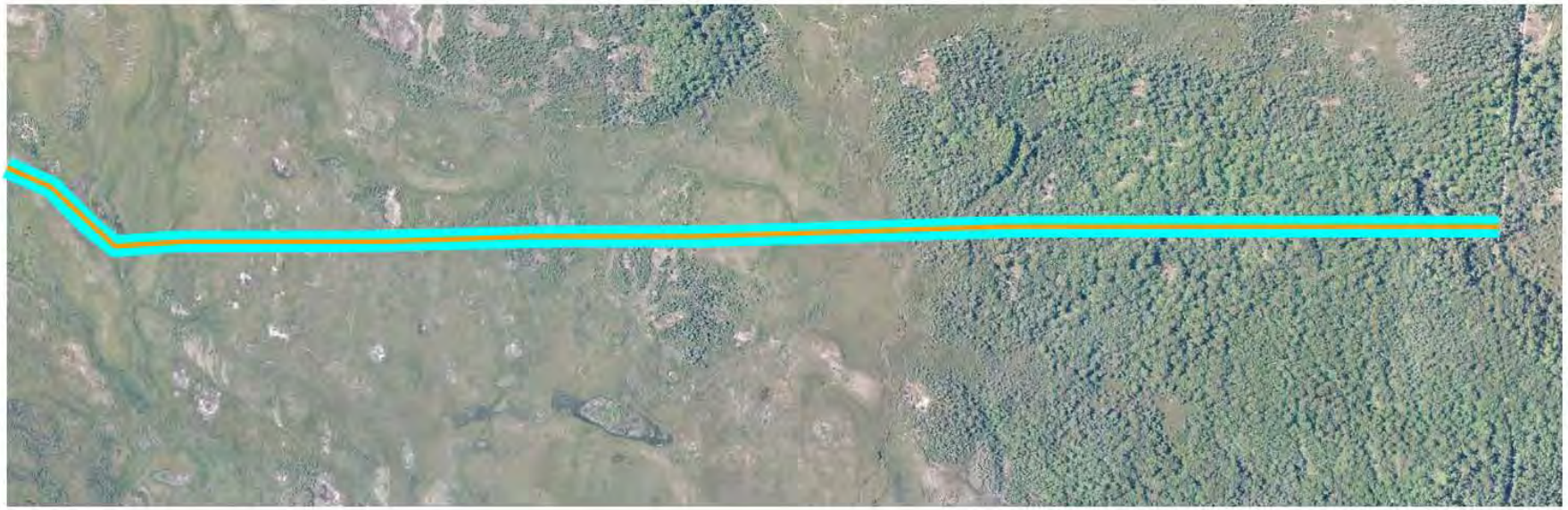

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Figure 5b

Doggerup Road Reserve
- Vegetation Condition (east)

Legend

Degraded

Excellent

Client
Shellbay Holdings Pty Ltd

N

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

5.0 SUMMARY

Natural Area Consulting was commissioned by Shellbay Holdings Pty Ltd via Bio Diverse Solutions to undertake an assessment of flora along the gazetted Doggerup Road reserve that runs through the western portion of D'Entrecasteaux National Park. The assessment will contribute to the Public Environmental Review process to determine the environmental acceptability of constructing a 3 metre wide limestone all weather track within the nominated road reserve. The scope of the appointment was to survey and record the flora occurring within 10 metres either side of the designated road route and to describe the vegetation units present within the survey area.

A field survey of the area to record and sample the flora was carried out in October 2010 and a return visit for later flowering species made in early February 2011. From this of two hundred and thirty six (236) species were recorded in the Survey Area. Six (6) species of Priority plants were identified, and potential plant numbers likely to be affected by track installation estimated based on survey outcomes. While ten (10) weed species were identified, they had a low presence in the survey area and were mainly found in the area of Karri forest at the eastern end of the survey area. In addition to the Priority species found, there were range extensions for two species (*Leucopogon rubricaulis* and *Schoenus submicrostachyus*), and one species was considered locally endemic (*Xyris indivisa*).

Seven different vegetation units were described, ranging from Tall Closed Forest to Open Heath. These were compared with the Regional Forest Agreement Vegetation Complexes and the area to be affected within each Vegetation Complex was estimated to be less than 1% for each complex. No Threatened or Priority Ecological Areas were found within the survey area.

The vegetation along the track ranges from degraded to good, depending on the regrowth that has occurred. The vegetation along either side of the proposed track route can be considered to be in excellent condition throughout the survey area.

Given the area of the track to be formalised, the area of vegetation complexes to be disturbed and the priority listing of nominated flora species rather being considered under immediate threat, the impact of the project on the flora and vegetation at the site is considered to be very low.

REFERENCES

Beard, J.S. (1981). *Vegetation Survey of Western Australia, Swan*. Crawley: University of Western Australia Press

DEC Duty Officer, Manjimup Office, October 2010 pers. comm.

Department of Agriculture and Food, SLIPs NRM Portal, available World Wide Web URL: http://spatial.agric.wa.gov.au/slip/framesetup.asp, accessed 11 August 2011.

Department of Conservation and Land Management, (1987), *Shannon Park and D'Entrecasteaux National Park Management Plan 1987-1997*, Department of Conservation and Land Management, Perth, Western Australia.

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

Department of Environmental Protection, (2000), *Bush Forever Vol 2 - Directory of Bush Forever Site,* Perth, Department of Environmental Protection.

Havel, J.J., (2002), *Review of Management Options for Poorly Represented Vegetation Complexes*, Mattiske Consulting Pty Ltd.

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

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

Species and Communities Branch (2010), List of Threatened Ecological Communities on the Department of Environment and Conservation's Threatened Ecological Community (TEC) Database endorsed by the Minister of the Environment, Department of Environment and Conservation, Perth, Western Australia.

Species and Communities Branch (2010), Priority Ecological Communities for Western Australia Version 15, Department of Environment and Conservation, Perth, Western Australia.

Wheeler, J., Marchant, N., & Lewington, M., (2002), *Flora of the South West*, University of Western Australia Press, Crawley, Western Australia.

APPENDIX 1: FIELD WORK RECORD

FIELD WORK RECORD			
DATE	**PERSONNEL**	**ROLE**	**SIGNATURE**
20/10/20	Jacquie Milner	Botanist	
	Sue Brand	Assistant	
21/10/10	Jacquie Milner	Botanist	
2/2/11	Jacquie Milner	Botanist	
3/2/11	Jacquie Milner	Botanist	

APPENDIX 2: CONSERVATION CODES

Conservation Code	Description	
R	Declared Rare Flora (DRF)	Taxa which have been adequately searched for, and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such, following approval by the Minister for the Environment, after recommendation by the State's Endangered Flora Consultative Committee. *(= Threatened Flora = Endangered + Vulnerable)*
1	Priority One	Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey
2	Priority Two	Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey
3	Priority Three	Taxa which are known from several populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in need of further survey
4	Priority Four	Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5–10 years

APPENDIX 3: FLORA SPECIES LIST

* Denotes an introduced species

FAMILY	Species	Common Name
	Class FILICOPSIDA (True Ferns)	
ADIANTACEAE	*Cheilanthes sieberi*	Mulga fern
DENNSTAEDTIACEAE	*Pteridium esculentum*	Bracken
LINDSAEACEAE	*Lindsaea linearis*	Screw fern
	Class CYCADOPSIDA (Cycads)	
ZAMIACEAE	*Macrozamia reidlei*	
ANGIOSPERMAE	**Class LILIOPSIDA** *(Monocotyledons)*	
ANARTHRIACEAE	*Anarthria prolifera*	
	Anarthria scabra	
ASPARAGACEAE	*Lomandra caespitosa*	
	Lomandra micrantha	
	Sowerbaea laxiflora	Purple Tassels
	Thysanotus gracilis	
	Thysanotus pseudojunceus	
CENTROLEPIDACEAE	*Aphelia cyperoides*	
COLCHICACEAE	*Burchardia congesta*	Milkmaids
	Burchardia multiflora	Dwarf Burchardia
CYPERACEAE	*Baumea articulata*	Jointed Twig-rush
	Baumea juncea	
	Baumea vaginalis	
	Baumea preissii	
	Cyathochaeta avenacea	
	Cyathochaeta clandestina	
	Evandra aristata	Zebra sedge
	Gahnia trifida	
	Gymnoschoenus anceps	
	**Isolepis marginata*	
	Lepidosperma effusum	
	Lepidosperma gladiatum	Coastal Sword-sedge
	Lepidosperma longitudinale	Pithy Sword-sedge
	Lepidosperma squamatum	
	Schoenus brevisetis	
	Schoenus efoliatus	
	Schoenus submicrostachyus	

FAMILY	Species	Common Name
	Tetraria capillaris	Hair Sedge
	Tetraria octandra	
DASYPOGONACEAE	*Dasypogon bromeliifolius*	Pineapple Bush
HAEMODORACEAE	*Anigozanthos flavida*	
	Conostylis aculeata	Prickly Conostylis
	Haemodorum laxum	
HEMEROCALLIDACEAE	*Caesia occidentalis*	
	Johnsonia lupulina	
IRIDACEAE	*Orthrosanthus polystachyus*	
	Patersonia occidentalis var. occidentalis	
JUNCAGINACEAE	*Triglochin linearis*	
ORCHIDACEAE	*Caladenia flava*	
	Cyrtostylis tenuissima	
	Diuris laevis	Nanny goat orchid
	Elythranthera brunonis	Purple enamel orchid
	Lyperanthus serratus	Rattle Beaks
	Paracaleana nigrita	Flying Ducks
	Prasophyllum cucullatum	
	Prasophyllum hians	Yawning Leek Orchid
	Pterostylis sp. Karri forest [W. Jackson BJ298]	
	Thelymitra flexuosa	Twisted sun orchid
PHILYDRACEAE	*Philydrella pygmaea*	
POACEAE	**Aira caryophyllea*	Silvery hairgrass
	Amphipogon laguroides	
	Austrodanthonia occidentalis	
	Austrostipa compressa	
	**Briza minor*	
	Neurachne alopecuroidea	Foxtal Mulga Grass
	Tetrarrhena laevis	Forest rice grass
RESTIONACEAE	*Desmocladus flexuosa*	
	Leptocarpus tenax	
	Loxocarya cinerea	
	Meeboldina denmarkica	
	Meeboldina roycei	
	Meeboldina scariosa	
	Meeboldina tephrina	
	Tremulina cracens	
XANTHORRHOEACEAE	*Xanthorrhoea preissii*	
XYRIDACEAE	*Xyris indivisa*	
	Xyris lanata	

FAMILY	Species	Common Name
	Class MAGNOLIOPSIDA *(Dicotyledons)*	
APIACEAE	*Actinotus laxus*	
	Daucus glochidiatus	Native carrot
	Hydrocotyle alata	
	Hydrocotyle callicarpa	Small pennywort
	Platysace compressa	
	Trachymene pilosa	Native parsnip
	Xanthosia candida	
ASTERACEAE	*Craspedia variabilis*	Billy-buttons
	Hyalospermum pusillum	
	**Hypochaeris glabra*	Flatweed
	Rhodanthe citrina	
	Senecio hispida	Hispid Fireweed
	Siloxerus humifusus	
	**Symphyotrichum squamatum*	syn. Aster subulatus
CAMPANULACEAE	*Lobelia heterophylla*	
	Lobelia rhombifolia	
	Lobelia rhytidosperma	
	Lobelia tenuior	Slender Lobelia
CASUARINACEAE	*Allocasuarina decussata*	Karri sheoak
CELASTRACEAE	*Stackhousia monogyna*	
DILLENIACEAE	*Hibbertia cuneiformis*	Cutleaf Hibbertia
	Hibbertia cunninghamii	
	Hibbertia furfuracea	
	Hibbertia perfoliata	
	Hibbertia racemosa	Stalked Guinea Flower
DROSERACEAE	*Drosera erythrorhiza*	
	Drosera glanduligera	Pimpernel sundew
	Drosera macrantha ssp macrantha	Bridal rainbow
	Drosera menziesii	
	Drosera neesii	Jewel Rainbow
	Drosera roseana	
ELAEOCARPACEAE	*Tremandra stelligera*	
ERICACEAE	*Andersonia barbata (P2)*	
	Andersonia sprengelioides	
	Astroloma ciliatum	
	Astroloma pallidum	
	Brachyloma preissii	Globe Heath
	Leucopogon australis	
	Leucopogon cordatus	
	Leucopogon racemulosus	

FAMILY	Species	Common Name
	Leucopogon revolutus	
	Leucopogon rubricaulis	
	Leucopogon verticillatus	Tassel Flower
	Sphenotoma gracilis	Swamp Paper-heath
EUPHORBIACEAE	**Euphorbia peplus*	Petty spurge
	Phyllanthus calycinus	False Boronia
FABACEAE	*Acacia cyclops*	
	Acacia divergens	
	Acacia hastula	
	Acacia pulchella var. goadbyi	
	Acacia urophylla	Pointed Leaved Acacia
	Aotus intermedia	
	Aotus tenuis	
	Bossiaea rufa	
	Callistachys lanceolata	
	Chorizema diversifolium	
	Daviesia inflata	
	Eutaxia myrtifolia	syn. E. obovata
	Gastrolobium sericeum	
	Hardenbergia comptoniana	Native Wisteria
	Hovea elliptica	Tree Hovea
	Isotropis cuneifolia	Granny bonnets
	Jacksonia horrida	
	Kennedia coccinea	Coral vine
	Latrobea diosmifolia	
	Mirbelia dilatata	Holly-leaved Mirbelia
	Pultanaea reticulata	
	Viminaria juncea	
GENTIANACEAE	**Centaurium erythraea*	Common Centaury
GOODENIACEAE	*Dampiera hederacea*	Karri Dampiera
	Dampiera leptoclada	
	Dampiera linearis	
	Dampiera pedunculatus	
	Dampiera trigona	
	Diaspasis filiformis	White swamp flower
	Goodenia filiformis (P3)	
	Goodenia pulchella	
	Goodenia pusilla	
	Scaevola microphylla	
	Scaevola striata var. striata	
	Velleia trinervis	

FAMILY	Species	Common Name
HALORAGACEAE	*Gonocarpus pusillus (P3)*	
	Meionectes brownii	
LAMIACEAE	*Hemiandra australis (P3)*	
LAURACEAE	*Cassytha racemosa forma racemosa*	
LENTIBULARIACEAE	*Utricularia multifida*	Pink petticoats
LOBELIACEAE	*Isotoma hypocrateriformis*	Woodbridge Poison
LOGANIACEAE	*Logania serpyllifolia*	
	Phyllangium paradoxum	Wiry mitrewort
MALVACEAE	*Rulingia cygnorum*	
	Sida hookeriana	
	Thomasia pauciflora	
	Thomasia paniculata	
	Thomasia rhynchocarpa	
	Thomasia sp. Big Brook [M. Koch 2373]	
	Thomasia sp Vasse [C. Wilkins &K. Shepard CW581]	syn. T. Heterophylla
MEYANTHACEAE	*Ornduffia parnassifolia*	
MYRTACEAE	*Astartea laricifolia*	
	Astartea sp. Scott River [D. Backshall 88233](P4)	
	Beaufortia sparsa	Swamp bottlebrush
	Calothamnus lateralis	
	Corymbia calophylla	
	Eucalyptus diversicolor	
	Eucalyptus marginata	
	Eucalyptus megacarpa	Bullich
	Eucalyptus patens	
	Homalospermum firmum	
	Hypocalymma strictum	
	Kunzea recurva	
	Kunzea sulphurea	
	Melaleuca densa	
	Melaleuca pauciflora	
	Melaleuca raphiophylla	
	Melaleuca thymoides	
	Pericalymma crassipes	
	Taxandria juniperina	syn. Agonis juniperina
	Taxandria linearifolia	syn. Agonis linearifolia
	Taxandria parviceps	syn. Agonis parviceps
	Verticordia plumosa	Plumed Featherflower
OLACACEAE	*Olax phyllanthi*	

FAMILY	Species	Common Name
OROBANCHACEAE	**Parentucellia viscosa*	Sticky Bartsia
OXALIDACEAE	**Oxalis incarnata*	Pale Wood Sorrel
PITTOSPORACEAE	*Billardiera floribunda*	
	Billardiera fusiformis	Australian bluebell
POLYGALACEAE	*Comesperma calymega*	Blue-spike Milkwort
	Comesperma flavum	
	Comesperma virgatum	Milkwort
PRIMULACEAE	**Lysimachia arvensis*	syn. Anagallis arvensis
PROTEACEAE	*Adenanthos obovatus*	Basket flower
	Banksia grandis	Bull Banksia
	Banksia ilicifolia	Holly-leaved Banksia
	Banksia littoralis	
	Banksia nivea	
	Banksia quercifolia	Oak-leaved Banksia
	Conospermum capitatum	
	Hakea ceratophylla	
	Hakea florida	
	Hakea linearis	
	Hakea oleifolia	
	Persoonia graminea	
	Petrophile acicularis	
RHAMNACEAE	*Trymalium floribundum*	Karri Hazel
RUBIACEAE	*Opercularia hispidula*	
	Opercularia volubilis	Twining Stinkweed
RUTACEAE	*Boronia crenulata var. crenulata*	Aniseed Boronia
	Boronia gracilipes	
	Boronia juncea subsp. minima	
	Boronia megastigma	
	Boronia stricta	
	Chorilaena quercifolia	Karri hazel
	Rhadinothamnus anceps	
SANTALACEAE	*Leptomeria scrobiculata*	
STYLIDACEAE	*Levenhookia pusilla*	
	Stylidium adnatum	
	Stylidium amoenum	
	Stylidium calcaratum	Book triggerplant
	Stylidium diversifolium	Touch-me-not
	Stylidium junceum	
	Stylidium leeuwinense (P3)	
	Stylidium repens	
	Stylidium schoenoides	Cow cicks

FAMILY	Species	Common Name
THYMELAEACEAE	*Pimelea hispida*	
	Pimelea longiflora	
TREMANDRACEAE	*Tetratheca filiformis*	

APPENDIX 4: VEGETATION CONDITION SCALE

From Bush Forever Vol 2, Department of Environmental Protection (2000)

Category	Description
1 Pristine	Pristine or nearly so, no obvious signs of disturbance.
2 Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
3 Very Good	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
4 Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
5 Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
6 Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

APPENDIX 5: RESULTS OF PRIORITY FLORA DESKTOP SEARCH

Species		Latitude	Longitude
Andersonia barbata	P2	34 50	116 02
Asplenium aethiopicum	P4	34 45 53.7	116 05 10.5
Astartea arbuscula ms	P4		
Astartea sp. Scott River	P4	34 49 42.0	116 03 00
		34 50	116 02
Calymperastrum latifolium	P2	34 45 58.5	116 04 54.1
Calytrix sp. Tutunup	P2		
Chordifex jacksonii	P3		
Cyathochaeta stipoides	P3	34 49 42.0	116 02 59.0
		34 48 33.5	116 04 24.1
		34 48 59.0	116 04 00.0
		34 48 22.0	116 04 21.00
		34 49 42	116 02 59.0
		34 48 41.3	116 04 17.3
Degelia flabellata	P2	34 45 53.4	116 05 13.5
Diuris heberlei	P2		
Drepanocladus aduncus	P2		
Fabronia hampeana	P2		
Gonocarpus intricatus	P4		
Gonocarpus pusillus	P3	34 49 12.1	116 00 31.8
		34 49 19	116 00 42.0
Gonocarpus simplex	P3		
Grevillea papillosa	P3		
Hemiandra australis	P3	34 49 17.1	116 00 26.9
		34 48 31.0	116 04 26.0
		34 50 09.2	116 01 02.0
		34 49 27.7	116 03 39.1
		34 49 19.0	116 00 42.00
		34 49 12.3	116 00 35.1
Hypocalymma cordifolium subsp. Minus	P4	34 47 27.00	116 02 19.00
		34 46 41.3	116 04 39.6
		34 48 19.7	116 04 27.5
Kennedia glabrata	R	34 45 50.7	116 05 12.5
		34 45 54.8	116 05 12.5
Lomandra ordii	P3		
Meeboldina crassipes	P3	34 49 17.7	116 03 47.5
		34 49 17.7	116 03 47.5
		34 49 22.0	116 03 42.00
		34 50 8.00	116 02 26.0
Melaleuca basicephala	P4	34 48 26.7	116 04 31.5

Species		Latitude	Longitude
		34 48 31.0	116 04 26.0
		34 49 42.0	116 03 0.0
Melaleuca diosmifolia	P3		
Melaleuca ringens	P3	34 49 55.7	116 00 05.5
		34 49 55.7	116 00 05.5
		34 49 40.7	116 00 54.5
Meziella trifida	R	34 49 16.0	116 03 48.7
		34 49 11.7	116 03 54.2
Microtis pulchella	P4		
Pertusaria trachyspora	P2		
Pultenaea pinifolia	P3		
Reedia spathacea	R	34 45 55.7	116 05 05.5
		34 46 25.7	116 04 50.5
		34 45 55.7	116 05 20.5
Rhacocarpus rehmannianus var. webbianus	R	34 45 48.1	116 05 11.9
		34 45 47.9	116 05 10.8
Stylidium gloeophyllum	P4	34 46 41.7	116 04 39.5
Stylidium leeuwinense	P3	34 45 57.9	116 04 58.1
Trithuria australis	P4		
Tyrbastes glaucescens	P4		
Xanthosia eichleri	P3		

APPENDIX 6: WESTERN AUSTRALIAN HERBARIUM VOUCHER SPECIMENS COLLECTION NUMBERS

Species	Priority	Collection Number
Andersonia barbata	P2	233
Astartea sp. Scott River	P4	262
Goodenia filiformis	P3	275
Gonocarpus pusillus	P3	173
Hemiandra australis	P3	105
Leucopogon rubricaulis		239
Schoenus submicrostachyus		147
Stylidium leeuwinense	P3	302

APPENDIX 7: THREATENED AND PRIORITY FLORA REPORT FORMS

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Version 1.0 January 2010

Please complete as much of the form as possible, with emphasis on those sections bordered in black.

TAXON: Goodenia filiformis **TPFL Pop. No:**

OBSERVATION DATE: 3 / 2 / 11 **CONSERVATION STATUS:** P3 New population ☐

OBSERVER/S: J. Milner **PHONE:** 041 894 5125

ROLE: Botanist **ORGANISATION:** Natural Area Consulting

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

Doggerup Road Reserve 4km north of Windy Harbour D'Entrecasteaux National Park

Reserve No:

DEC DISTRICT: Donnelly **LGA:** Manjimup Land manager present: ☐

DATUM:
GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☑
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☑ DegMinSec ☐ UTMs ☐

Lat / Northing: -34.7889

Long / Easting: 116.032

ZONE:

METHOD USED:
GPS ☑ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☐	Shire road reserve ☐
National park ☑	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole _____ to _____	Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☑ Full survey ☐ Area observed (m²): 40

EFFORT: Time spent surveying (minutes): 5 No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual ☐ Extrapolation ☐ Estimate ☑ Count method: (Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:

	Mature:	Juveniles:	Seedlings:	Totals:
Alive	24			24
Dead				

Area of pop (m²): 6

Note: Pls record count as numbers (not percentages) for database

QUADRATS PRESENT: No. Size Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☑
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: 70 %

CONDITION OF PLANTS: Healthy ☑ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
• Track maintenance PER for conversion to all-weather track in preparation	N	M	M
•			
•			

Please return completed form to DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Branch

Record entered by: **Sheet No.:** **Record Entered in Database** ☐

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Version 1.0 January 2010

HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☐
Flat ☐
Open depression ☑
Drainage line ☐
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other: _____

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☐
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☐
Sandy loam ☑
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: _____

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☐
Grey ☑
Black ☐
Specify other: _____

DRAINAGE:
Well drained ☐
Seasonally inundated ☑
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: _____
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☑ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia); 2. Open shrubland (Hibbertia sp., Acacia spp.); 3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Closed Shrubland
2. Baumea sedgeland (Baumea articulata)
3.
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp
Taxandria parviceps, T. juniperina, Beaufortia sparsa, Rhadinothamnus anceps, Evandra aristata, Homalospermum firmum

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☑ Very good ☐ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: 2009 **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☑ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☑ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

SPECIMEN: Collectors No: 275 WA Herb. ☑ Regional Herb. ☐ District Herb. ☐ Other: _____

ATTACHED: Map ☑ Mudmap ☐ Photo ☐ GIS data ☐ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☐ District Office ☐ Other:

Submitter of Record: J. Milner Role: Botanist Signed: _____ Date: 11 / 8 / 11

Please return completed form to DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Branch.

Record entered by: _____ **Sheet No.:** _____ **Record Entered in Database** ☐

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Threatened and Priority Flora Report Form

Version 1.0 January 2010

Please complete as much of the form as possible, with emphasis on those sections bordered in black.

TAXON: Stylidium leeuwinense **TPFL Pop. No:**

OBSERVATION DATE: 3/2/11 **CONSERVATION STATUS:** P3 New population ☐

OBSERVER/S: J. Milner **PHONE:**

ROLE: Botanist **ORGANISATION:** Natural Area Consulting

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

Doggerup Road Reserve 4km north of Windy Harbour D'Entrecasteaux National Park

middle of track **Reserve No:**

DEC DISTRICT: Donnelly **LGA:** Manjimup Land manager present: ☐

DATUM:
GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☑
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☑ DegMinSec ☐ UTMs ☐

Lat / Northing: -34.7908

Long / Easting: 116.054

ZONE:

METHOD USED:
GPS ☑ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☐	Shire road reserve ☐
National park ☑	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole ____ to ____	Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☑ Full survey ☐ Area observed (m²): 100

EFFORT: Time spent surveying (minutes): 5 No. of minutes spent / 100 m²: 5

POP'N COUNT ACCURACY: Actual ☐ Extrapolation ☐ Estimate ☑ Count method: individuals
(Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:

	Mature:	Juveniles:	Seedlings:	Totals:
Alive		20		
Dead				

Area of pop (m²):

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. ____ Size ____ Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☑ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: ____ %

CONDITION OF PLANTS: Healthy ☑ Moderate ☐ Poor ☐ Senescent ☐

COMMENT: Young plants, recent fire

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
• Track maintenance PER for conversion to all-weather track in preparation	N	M	M
•			
•			

Please return completed form to DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Branch.

Record entered by: **Sheet No.:** **Record Entered in Database** ☐

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HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☑
Flat ☐
Open depression ☐
Drainage line ☐
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other: _____

LOOSE ROCK: (on soil surface; eg gravel, quartz fields)
0-10% ☐
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☑
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: _____

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☐
Grey ☑
Black ☐
Specify other: _____

DRAINAGE:
Well drained ☑
Seasonally inundated ☐
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: _____
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☑ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg. 1. Banksia woodland (B. attenuata, B. ilicifolia); 2. Open shrubland (Hibbertia sp., Acacia spp.); 3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Heathland
2.
3.
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp

Patersonia occidentalis, Anarthria scabra
Adenanthos obovatus Boronia crenulata

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☑ Very good ☐ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: 2009 **Fire Intensity:** High ☐ Medium ☑ Low ☐ No signs of fire ☐

FENCING: Not required ☑ Present ☐ Replace / repair ☐ Required ☐ Length req'd _____

ROADSIDE MARKERS: Not required ☑ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

SPECIMEN: Collectors No: 302 WA Herb. ☑ Regional Herb. ☐ District Herb. ☐ Other: _____

ATTACHED: Map ☑ Mudmap ☐ Photo ☐ GIS data ☐ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☐ District Office ☐ Other:

Submitter of Record: J. Milner Role: Botanist Signed: _____ Date: 11/8/11

Please return completed form to DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

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Record entered by: _____ **Sheet No.:** _____ **Record Entered in Database** ☐

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Please complete as much of the form as possible, with emphasis on those sections bordered in black.

TAXON: Astartea sp. Scott River [D. Backshall 88233] **TPFL Pop. No:**

OBSERVATION DATE: 2/2/11 **CONSERVATION STATUS:** P4 New population ☐

OBSERVER/S: J. Milner **PHONE:** 041 894 5725

ROLE: Botanist **ORGANISATION:** Natural Area Consulting

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

Doggerup Road Reserve 4 km North of Windy Harbour
D'Entrecasteaux National Park

Reserve No:

DEC DISTRICT: Donnelly **LGA:** Manjimup Land manager present: ☐

DATUM: GDA94 / MGA94 ☐ AGD84 / AMG84 ☐ WGS84 ☑ Unknown ☐

COORDINATES: (If UTM coords provided, Zone is also required)
DecDegrees ☑ DegMinSec ☐ UTMs ☐
Lat / Northing: -34.7874
Long / Easting: 116.015
ZONE:

METHOD USED:
GPS ☑ Differential GPS ☐ Map ☐
No. satellites: ___ Map used: ___
Boundary polygon captured: ☐ Map scale: ___

LAND TENURE:
Nature reserve ☐ Timber reserve ☐ Private property ☐ Rail reserve ☐ Shire road reserve ☐
National park ☑ State forest ☐ Pastoral lease ☐ MRWA road reserve ☐ Other Crown reserve ☐
Conservation park ☐ Water reserve ☐ UCL ☐ SLK/Pole _____ to __ Specify other: _____

AREA ASSESSMENT: Edge survey ☐ Partial survey ☑ Full survey ☐ Area observed (m²): 5

EFFORT: Time spent surveying (minutes): 2 No. of minutes spent / 100 m²: ____

POP'N COUNT ACCURACY: Actual ☐ Extrapolation ☐ Estimate ☐ Count method: individuals
(Refer to field manual for list)

WHAT COUNTED: Plants ☑ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:
Alive	1			
Dead				

Area of pop (m²): ___
Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. ___ Size _____ Data attached ☐ Total area of quadrats (m²): ___

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☑ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: ____%

CONDITION OF PLANTS: Healthy ☐ Moderate ☑ Poor ☐ Senescent ☐

POP'N NOTES:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify** agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
• Track creation PER for conversion to all-weather track in preparation	N	M	M
•			
•			

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HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☐
Flat ☑
Open depression ☐
Drainage line ☐
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other: —

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☐
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☐
Sandy loam ☑
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: —

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☐
Grey ☑
Black ☐
Specify other: —

DRAINAGE:
Well drained ☐
Seasonally inundated ☑
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: —
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☑ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia); 2. Open shrubland (Hibbertia sp., Acacia spp.); 3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Open Banksia Woodland (B. littoralis, B. quercifolia)
2. Open Taxandria Shrubland (T. parviceps, T. juniperina)
3. Sparse shrubland (Melaleuca densa, Leucopogon cordatus)
4. Sparse Meeboldina rushland (M. royceri, M. scariosa)

ASSOCIATED SPECIES:
Eutaxia myrtifolia
Other (non-dominant) spp

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☑ Very good ☐ Good ☐ Degraded ☐ Completely degraded ☐

HABITAT NOTES:

FIRE HISTORY: **Last Fire:** Season/Month:_____ Year: ____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☑

FENCING: Not required ☑ Present ☐ Replace / repair ☐ Required ☐ Length req'd: __

ROADSIDE MARKERS: Not required ☑ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: __

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

SPECIMEN: Collectors No: 262 WA Herb. ☑ Regional Herb. ☐ District Herb. ☐ Other: _____

ATTACHED: Map ☑ Mudmap ☐ Photo ☐ GIS data ☐ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☐ District Office ☐ Other:

Submitter of Record: J. Milner Role: Botanist Signed: [signature] Date: 1/12/11

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RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Branch.

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Please complete as much of the form as possible, with emphasis on those sections bordered in black.

TAXON: Andersonia barbata **TPFL Pop. No:**

OBSERVATION DATE: 21/10/10 **CONSERVATION STATUS:** P2 New population ☐

OBSERVER/S: J. Milner **PHONE:** 041 894 5125

ROLE: Botanist **ORGANISATION:** Natural Area Consulting

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

Doggerup Road Reserve 4km north of Windy Harbour D'Entrecasteaux National Park

Reserve No:

DEC DISTRICT: Donnelly **LGA:** Manjimup Land manager present: ☐

DATUM:
GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☑
Unknown ☐

COORDINATES: (If UTM coords provided, Zone is also required)
DecDegrees ☑ DegMinSec ☐ UTMs ☐
Lat / Northing: -34.7907
Long / Easting: 116 061
ZONE:

METHOD USED:
GPS ☑ Differential GPS ☐ Map ☐
No. satellites: ___ Map used: ___
Boundary polygon captured: ☐ Map scale: ___

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☐	Shire road reserve ☐
National park ☑	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole ____ to ___	Specify other: ____

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☑ Area observed (m²): 400

EFFORT: Time spent surveying (minutes): 15 No. of minutes spent / 100 m²: 3.75

POP'N COUNT ACCURACY: Actual ☑ Extrapolation ☐ Estimate ☐ Count method: individuals
(Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:
Alive	6			6
Dead				

Area of pop (m²): 150
Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. ___ Size ___ Data attached ☐ Total area of quadrats (m²): ___

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☑
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: 100 %

CONDITION OF PLANTS: Healthy ☐ Moderate ☑ Poor ☐ Senescent ☐

POP'N NOTES:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
• Track maintenance PER for conversion to all-weather track in preparation	N	M	M
•			
•			

Please return completed form to DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Branch.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ☐

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HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☑
Flat ☐
Open depression ☐
Drainage line ☐
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☑
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other: —

LOOSE ROCK: (on soil surface; eg gravel, quartz fields)
0-10% ☑
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☐
Sandy loam ☑
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: —

SOIL COLOUR:
Red ☐
Brown ☑
Yellow ☐
White ☐
Grey ☐
Black ☐
Specify other: —

DRAINAGE:
Well drained ☑
Seasonally inundated ☐
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: —
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☑ Moist ☐ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia); 2. Open shrubland (Hibbertia sp., Acacia spp.); 3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Open Forest (Eucalyptus marginata, Corymbia calophylla)
2. Thomasia shrubland (T. paniculata, T. sp Big Brook)
3.
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp: Hibbertia cuneiformis Acacia urophylla Sida hookeriana

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☑ Very good ☐ Good ☐ Degraded ☐ Completely degraded ☐

HABITAT NOTES: —

FIRE HISTORY: **Last Fire:** Season/Month:_____ Year: ____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☑

FENCING: Not required ☑ Present ☐ Replace / repair ☐ Required ☐ Length req'd: —

ROADSIDE MARKERS: Not required ☑ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: —

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

SPECIMEN: Collectors No: 233 WA Herb. ☑ Regional Herb. ☐ District Herb. ☐ Other: _____

ATTACHED: Map ☑ Mudmap ☐ Photo ☐ GIS data ☐ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☐ District Office ☐ Other: _____

Submitter of Record: J. Milner Role: Botanist Signed: [signature] Date: 11/8/11

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RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Branch.

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Please complete as much of the form as possible, with emphasis on those sections bordered in black.

TAXON: Hemiandra australis — TPFL Pop. No:

OBSERVATION DATE: 20/10/10 — CONSERVATION STATUS: R3 — New population ☐

OBSERVER/S: J. Milner — PHONE: 041 894 5125

ROLE: Botanist — ORGANISATION: Natural Area Consulting

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

Doggerup Road Reserve 4 km North of Windy Harbour
D'Entrecasteaux National Park

Reserve No:

DEC DISTRICT: Donnelly — LGA: Manjimup — Land manager present: ☐

DATUM:

GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☑
Unknown ☐

COORDINATES: (If UTM coords provided, Zone is also required)

DecDegrees ☑ DegMinSec ☐ UTMs ☐

Lat / Northing: -34.7880

Long / Easting: 116.0290

ZONE:

METHOD USED:

GPS ☑ Differential GPS ☐ Map ☐

No. satellites: ___ Map used: ___

Boundary polygon captured: ☐ Map scale: ___

LAND TENURE:

Nature reserve ☐ Timber reserve ☐ Private property ☐ Rail reserve ☐ Shire road reserve ☐
National park ☑ State forest ☐ Pastoral lease ☐ MRWA road reserve ☐ Other Crown reserve ☐
Conservation park ☐ Water reserve ☐ UCL ☐ SLK/Pole ____ to ___ Specify other: ____

AREA ASSESSMENT: Edge survey ☐ Partial survey ☑ Full survey ☐ Area observed (m²): 2000

EFFORT: Time spent surveying (minutes): 20 No. of minutes spent / 100 m²: 1

POP'N COUNT ACCURACY: Actual ☐ Extrapolation ☐ Estimate ☑ Count method: individuals
(Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:
Alive	50			50
Dead				

Area of pop (m²): ___

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. ___ Size ___ Data attached ☐ Total area of quadrats (m²): ___

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: ____%

CONDITION OF PLANTS: Healthy ☑ Moderate ☐ Poor ☐ Senescent ☐

POP'N NOTES:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. Specify agent where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential impact (L-E)	Potential Threat Onset (S-L)
• Track creation PER for conversion to all-weather track in preparation	N	M	M
•			
•			

Please return completed form to DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: Please forward to **Flora Administrative Officer**, Species and Communities Branch.

Record entered by: ____ Sheet No.: ____ Record Entered in Database ☐

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HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☑
Flat ☐
Open depression ☐
Drainage line ☐
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other: —

LOOSE ROCK: (on soil surface; eg gravel, quartz fields)
0-10% ☐
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☑
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: —

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☑
Grey ☐
Black ☐
Specify other: —

DRAINAGE:
Well drained ☑
Seasonally inundated ☐
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: —
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☑ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia); 2. Open shrubland (Hibbertia sp., Acacia spp.); 3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Taxandria Woodland (T. flexuosa)
2. Open Banksia Woodland (B. ilicifolia)
3. Jacksonia shrubland (J. horrida)
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp: Macrozamia riedlei

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☑ Very good ☐ Good ☐ Degraded ☐ Completely degraded ☐

HABITAT NOTES:

FIRE HISTORY: Last Fire: Season/Month:_____ Year: _____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☑

FENCING: Not required ☑ Present ☐ Replace / repair ☐ Required ☐ Length req'd: __

ROADSIDE MARKERS: Not required ☐ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: __

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

SPECIMEN: Collectors No: 105 WA Herb. ☑ Regional Herb. ☐ District Herb. ☐ Other: _____

ATTACHED: Map ☐ Mudmap ☐ Photo ☐ GIS data ☐ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☐ District Office ☐ Other:

Submitter of Record: J. Milner Role: Botanist Signed: [signature] Date: 11/2/11

Please return completed form to DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: Please forward to **Flora Administrative Officer**, Species and Communities Branch.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ☐

Department of Environment and Conservation
Our environment, our future

Threatened and Priority Flora Report Form

Version 1.0 January 2010

Please complete as much of the form as possible, with emphasis on those sections bordered in black.

TAXON: Gonocarpus pusilis **TPFL Pop. No:** ____

OBSERVATION DATE: 21/10/10 **CONSERVATION STATUS:** P3 New population ☐

OBSERVER/S: J. Milner **PHONE:** 041 894 5125

ROLE: Botanist **ORGANISATION:** Natural Area Consulting

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

Doggerup Road Reserve 4 km north of Windy Harbour
D'Entrecasteaux National Park

Reserve No: ____

DEC DISTRICT: Donnelly **LGA:** Manjimup Land manager present: ☐

DATUM: GDA94 / MGA94 ☐ AGD84 / AMG84 ☐ WGS84 ☑ Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required) DecDegrees ☑ DegMinSec ☐ UTMs ☐

Lat / Northing: -34.7905

Long / Easting: 116.0380

ZONE: ____

METHOD USED: GPS ☐ Differential GPS ☐ Map ☐

No. satellites: ____ Map used: ____

Boundary polygon captured: ☐ Map scale: ____

LAND TENURE:

Nature reserve ☐ Timber reserve ☐ Private property ☐ Rail reserve ☐ Shire road reserve ☐
National park ☑ State forest ☐ Pastoral lease ☐ MRWA road reserve ☐ Other Crown reserve ☐
Conservation park ☐ Water reserve ☐ UCL ☐ SLK/Pole ____ to ____ Specify other: ____

AREA ASSESSMENT: Edge survey ☐ Partial survey ☑ Full survey ☐ Area observed (m²): 20

EFFORT: Time spent surveying (minutes): 2 No. of minutes spent / 100 m²: ____

POP'N COUNT ACCURACY: Actual ☐ Extrapolation ☐ Estimate ☑ Count method: Individual
(Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:
Alive	5			
Dead				

Area of pop (m²): ____

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. ____ Size ____ Data attached ☐ Total area of quadrats (m²): ____

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☑ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: ____%

CONDITION OF PLANTS: Healthy ☑ Moderate ☐ Poor ☐ Senescent ☐

POP'N NOTES: ____

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
• Track Maintenance PER for conversion to all-weather track in preparation	N	M	M
•			
•			

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RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Branch.

Record entered by: ____ **Sheet No.:** ____ **Record Entered in Database** ❑

Department of Environment and Conservation
Our environment, our future

Threatened and Priority Flora Report Form

Version 1.0 January 2010

HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☐
Flat ☑
Open depression ☐
Drainage line ☐
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other: ____

LOOSE ROCK: (on soil surface; eg gravel, quartz fields)
0-10% ☐
10-30% ☐
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☐
Sandy loam ☑
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: ____

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☐
White ☐
Grey ☑
Black ☐
Specify other: ____

DRAINAGE:
Well drained ☐
Seasonally inundated ☑
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: ____
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☐ Moist ☑ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg. 1. Banksia woodland (B. attenuata, B. ilicifolia); 2. Open shrubland (Hibbertia sp., Acacia spp.) ; 3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Open Heathland
2.
3.
4.

ASSOCIATED SPECIES:
Other (non-dominant) spp: Beaufortia sparsa, Astartea laricifolia, Melaleuca parviflora, Meebaldina scariosa

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☑ Very good ☐ Good ☐ Degraded ☐ Completely degraded ☐

HABITAT NOTES: ____

FIRE HISTORY: **Last Fire:** Season/Month: ____ Year: 2009 **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☑ Present ☐ Replace / repair ☐ Required ☐ Length req'd: ____

ROADSIDE MARKERS: Not required ☑ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: ____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Given location not precise. Found within 10m of track between -34.790E(S) 116.0373 (E) and -34.790E(S) 116.05287 (E)

SPECIMEN: Collectors No: 173 WA Herb. ☑ Regional Herb. ☐ District Herb. ☐ Other: ____

ATTACHED: Map ☑ Mudmap ☐ Photo ☐ GIS data ☐ Field notes ☐ Other: ____

COPY SENT TO: Regional Office ☐ District Office ☐ Other:

Submitter of Record: J. Milner Role: Botanist Signed: [signature] Date: 11/8/11

Please return completed form to DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Branch.

Record entered by: ____ **Sheet No.:** ____ **Record Entered in Database** ☐

Appendix 7

Dieback (*Phytophthora cinnamomi*) Assessment

Moore Mapping April 2011

MOORE MAPPING
Less DISEASE SPREAD

REPORT AND RECOMMENDATIONS

FOR THE MAPPING OF THE DISEASE CAUSED BY

Phytophthora cinnamomi (P.c.)

Doggerup Access Track, Malimup Block

Disease Mapped by Senior Disease Hygiene Officer: Ian Moore

REPORT AUTHOR: Ian Moore REPORT DATE: 7/4/2011

MAP NUMBER: 2011 Doggerup Track Malimup

Total Area Mapped	31.5 Km
DRA - (Quarantine)	No
Method of interpretation Stripline/Recheck/Linear	Linear
Major tree species	Karri, Jarrah, Marri, Banksia
Map Scale:	1:25,000
Map date	11/3/2011
Products	***Phytophthora cinnamomi*** Protectable Areas Map and Report.

TABLE OF CONTENTS

1 INTRODUCTION

The access track into the Doggerup private property Location 7965 within Malimup Block, was mapped for the disease presence of *Phytophthora cinnamomi* (*P.c.*), a menacing root rotting pathogen. 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 *Phytophthora cinnamomi* Management Plan.

The area was mapped on the 11/3/2011 by, Senior Disease Hygiene Officer Ian Moore from Moore Mapping Pty Ltd, in trust for Moore Mapping Trust.

Kathryn Kinnear from Bio Diverse Solutions, requested the mapping of the disease prior to the commencement of soil disturbance activities, related to the proposed upgrade of the track.

1.1 LOCATION

The mapped area consists of one section of track connecting between Windy Harbour Road to the east and Location 7965 adjacent the coast to the west.

The total length of track is 6.3 km and consists of a mapped 50m wide corridor with a total area of 31.5 Ha.

The mapped area does not occur within a DRA (quarantined) area.

1.2 BACKGROUND INFORMATION

1.2.1 PREVIOUS DISEASE MAPPING

No previous disease mapping is known to have occurred in the area.

1.2.2 LAND USE

The designated land use for the area is D'Entrecasteaux National Park.

1.2.3 PAST DISTURBANCES

The track is located within a survey, originally surveyed as access into the property.

The track has been maintained on a sporadic basis by DEC, to manage fire and also in the past, by the land owners from Location 7965.

The eastern karri section, in the 1980s, had some major construction work, where large amounts of adjoining raw material was pushed up to form a road, this work was done by the Shire of Manjimup, this has also since overgrown.

The property originally belonged to the Wheatley's, of which the Wheatley Coast Road is named. The Wheatley's used the area to graze cattle on a seasonal basis.

1.2.4 FIRE HISTORY

Approximately 2.5 km of the track, from east of sample 5 to the western side of the Karri, was burnt approximately 2 to 3 years ago. All the remaining areas appear as if they were burnt some time ago.

1.2.5 RAINFALL ZONE

The area is located in the 1400mm to 1500mm rainfall isohyets.

1.2.6 LANDFORMS AND VEGETATION TYPES

There are three landforms within the mapped area:

Hawk

This is a very gentle sloping to slightly undulating terrain, with some minor swampy drainage floors. Aeolian sands, as an extensive surface mantle, form hummocks, low dunes and sheets. The dominant soils are red-brown to yellowish red loamy sands, from 40 to 80 cm deep. Tall open Karri forests are dominant, but Jarrah and Marri are more frequent further south. There are some thickets of *Banksia littoralis* and *Melaleuca preissiana, with Callistachys lanceolata.*

Meerup (Ms)

The oldest of the coastal dune system, these dunes have smooth, rounded crests with gentle slopes. The soils are often podzols usually with a bleached A horizon and a brown to yellow-brown B horizon. The vegetation is usually marri woodlands with some jarrah, also present are *Eucalyptus megacarpa* and *E. cornuta.*

Meerup (Mf)

Generally swampy interdune flats which are often dominated by swampy tracts. Soils are podzols with a dark brown to black B horizon beneath bleached A horizon sand. Banksia woodlands and thickets are dominant, some pockets of *Eucalyptus cornuta, E. megacarpa* and *Corymbia calophylla* occur.

For more Information refer to Churchward, H. M (1992) *"Soils and Landforms of the Manjimup Area, Western Australia"*, Department of Agriculture, South Perth

2 MATERIALS AND METHODS

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.

2.1 DEMARCATION

Where *Phytophthora cinnamomi (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.

2.2 MAPPING

Boundaries are directly uploaded from Global Positioning System (GPS) and adjusted relative to map features. Additional schematic boundaries are also placed on the map at this stage, (e.g. determining unprotectable boundaries), using GPS data, field observation, map contours and aerial photographs.

2.3 GPS SURVEY

Accuracy for the GPS is to < 5m 95% of the time, with a possibility of degradation up to 5% of the time, due to weather conditions, density of the cloud and vegetation at the time of capture.

3. RESULTS

3.1 DISEASE DISTRIBUTION

Disease distribution spans a large portion of the area (3.7km) and was found to be located in most of the swampy low lying areas.

3.2 DISEASE SYMPTOMS

3.2.1 Disease Expression

The disease expression is variable, ranging from obvious to quite subtle. The variation between subtle and obvious, seemed dependent upon the age of the infestation, generally the more recent the infestation, the more obvious. For instance the infestation west of the Gardner River watershed was very obvious as this infestation seems recent. The majority of the infestation east of the Gardner Watershed was subtle.

Indicator species used for interpreting in the area include *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 caerulee, Hakea Spp and *Macrozamia riedlei.*

3.2.2 Other Phytophthora species

No other *Phytophthora* species infestations were located during the sampling regime.

3.2.3 Drought

There were minimal deaths relating to drought.

3.2.4 Fire Damage

There were some deaths relating to fire in the burnt section between sample 5 and the uninterpretable karri forest, burnt approximately two to three years ago. This fire was of a moderate to low intensity.

3.2.5 Armillaria

Some deaths, which may be contributed to *Armillaria,* were noted in the two uninfested sections.

3.2.6 Insect or Animal Damage

There were minimal deaths relating to insect damage.

3.2.7 Expression Anomalies

Within the eastern infestation, in the better drained sandy sections, the area still has large numbers of healthy *X. preissii.*

3.3 ALLOCATION OF CATEGORIES AND AREAS

3.3.1 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
TOTAL AREA	31.5	

3.3.2 Uninterpretable

There is one uninterpretable area 1.3km in length, (6.4ha in area), this area is associated with karri type forest.

3.3.3 Areas excluded within the area (eg recently burnt or harvested).

No sections required exclusion.

3.3.4 *Protectable areas*

Three sections of track are deemed protectable:

1. The uninterpretable section at the eastern end of the track, adjacent 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.

3.3.5 Unprotectable Areas

Three short sections of track are deemed unprotectable:

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

These areas are unprotectable due to the minimal size of the areas.

3.3.6 High Impact Areas

The majority of the coastal areas of the Meerup landform in this particularly high rainfall area (>1400mm), once infested, tends to display high impact, particularly Meerup f. Due to the dominant susceptible *Banksia Spp* and *Xanthorrhoea preissii* species.

3.4 ROADS, TRACKS AND BORROW PITS ETC.

3.4.1 Roads and Tracks

The Doggerup access track, consists of an overgrown track, with an impassable number of a creeks which adjoin each other in a swampy section starting 3.5 km west of Windy Harbour Road. At the end of summer it currently is possible to access the remaining sections of track. However up until survey work was carried out, relating to this proposed operation, it appeared as if, access had not occurred for at least a couple of years.

3.4.2 Borrow Pits

There are no known borrow pits within this area.

3.5 SAMPLE RESULTS

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).

4. DISCUSSION

The eastern infestation was old, with only a few recent scattered indicator deaths visible. Signs of disease in this section were the frequent remains of *X. preissii* stumps along some sections. Much of the evidence in this section was burnt away approximately 2 to 3 years ago. Other than the sample on the rise (sample 1) and the occasional recent scattered death, other evidence pointing to disease presence was the remnant Banksias on the surrounding hills, (many of which were some distance from the track), displaying a clear disease edge on the perimeter of the small remnant of Banksias.

The western infestation, west of the watershed, was very active and appeared to be quite a new infestation along the majority of its length. For most of the time here, the disease edge followed in a parallel alignment mostly within 10m either side of the track, suggesting this section of track (over 400m) had disease vectored in by a vehicle or more likely a machine, less than 10 years ago or possibly even < 5 years ago.

5 CONCLUSION

A Disease Hygiene Officer from Moore Mapping Pty Ltd has mapped the 6.3km surveyed access track into the Doggerup Property, Location 7065 from Windy Harbour Road. 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 *Phytophthora cinnamomi* Protectable Areas Map produced for the area has proposed age limits. Map boundaries should be checked before operations proceed if the map is older than one year 11/3/2012. This map expires and therefore should not be used if it is older than three years since the original interpretation for this map 11/3/2014.

Protectable areas that have had any unhygienic soil moving operation in them or have had some time lapse (months), between a previous operation and a new proposed operation about to recommence, become unreliable and therefore should be checked prior to further/new activities.

6 RECOMMENDATIONS

It is recommended that:

1. All machines and vehicles to be clean, prior to entering protectable areas.
2. For protectable areas, check any raw materials to be used for road construction or maintenance prior to use, to ensure such materials are disease free.

7 REFERENCES

CALM (2003) "*Phytophthora cinnamomi* and Disease Caused by it, Volume I - Management Guidelines", Department of Conservation and Land Management, Dwellingup Training Centre.

Churchward, H. M (1992) *"Soils and Landforms of the Manjimup Area, Western Australia"*, Department of Agriculture, South Perth.

Phytophthora cinnamomi and Disease caused by it Volume II - Interpretation Guidelines for Detection, Diagnosis and Mapping" (DOC, 2001 revised 2007).

Ian Moore, Senior Disease Hygiene Officer: _____ Date: _____

Signed by Officer Receiving: _____ Date: _____

APPENDIX I

SAMPLE SUMMARY

Plant Species	No. of samples	*Pc* positive	*Pc*%	ISD *Pc* positive				ISD *Pc* negative				ISD *P spp* positive			
				M	C	S	I	M	C	S	I	M	C	S	I
Banksia ilicifolia	2	1	50			1				1					
Banksia quercifolia	2	1	50	1				1							
Xanthorrhoea preissii	1	1	100			1									
TOTALS	5	3	60	1		2		1		1					

INDICATOR SPECIES DEATH (ISD)

M = Multiple C = Cluster S = Scattered I = Isolated

Sample No	Plant Sampled	Reference No	Result (cin, neg, other)
1.	*Xanthorrhoea preissii*	412911 6149743	1. cin
2.	*Banksia ilicifolia*	411266 6149984	2. neg
3.	*Banksia quercifolia*	409936 6150086	3. cin
4.	*Banksia ilicifolia*	411231 6150034	4. neg
5.	*Banksia ilicifolia*	411305 6149978	5. cin

The indicator species mentioned as sampled above may only be one of several indicator species placed in the sample bag at the time. Normal practice for Moore Mapping is to sample a few indicator species at a sample site.

DONNELLY DISTRICT

D'ENTRECASTEAUX NATIONAL PARK, MALIMUP BLOCK, DOGGERUP ACCESS, *Phytophthora cinnamomi* PROTECTABLE AREAS MAP

UNINFESTED (PROTECTABLE)
Determined by a Disease Officer to be free of symptoms, which express *P.cinnamomi*

UNINTERPRETABLE (PROTECTABLE)
Where susceptible plants are obscured or insufficient to determine *P.cinnamomi* presence

INFESTED
Determined by a Disease Officer to have *P.cinnamomi* presence

UNPROTECTABLE
Where autonomous *P.cinnamomi* spread may occur within a relative short time

Disease mapped by Moore Mapping PTY LTD in trust for Moore Mapping Trust. Mapped on the **11-3-2011** using Linear Survey.
Map expires on the **11-3-2014**. If the operation is not completed by the **11-3-2012**, then the area must be rechecked.

2 LANE SEALED RD
2 LANE GRAVEL RD
VEHICULAR TRACK

POSITIVE SAMPLE [Y]
SUB SPECIES SAMPLE [Y]
NEGATIVE SAMPLE [Y]

N

CONTOUR (20m intervals)
SWAMP
WATER POINT
KARRI
WANDOO
QUARRY/PIT
PLANTATION
POWERLINE

Width of Linear Corridor 50 m
Length of Linear Corridor 6.3 km

SCALE 1 : 25,000
Scale bar = 2 kilometres

0 2 4 6 8 10 12 14 16 18 20

AREA STATEMENT

CATEGORIES	AREA HA
UNIFESTED	6.5
UNITERPRETABLE	6.4.
INFESTED	18.6
UNPROTECTABLE (overlays other categories)	0.9
PROTECTABLE (Uninfested+ Uninterpretable–Unprotectable)	12.0
TOTAL AREA	31.5

GDA
Zone 50, Datum GDA 94

MOORE MAPPING
Less DISEASE SPREAD

Appendix 8

Preliminary Fauna Report, Level 1 Fauna Assessment

Bio Diverse Solutions 2011

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

Preliminary Fauna Investigation- Level 1

Kathryn Kinnear

Bio Diverse Solutions

19/10/2011

BIO DIVERSE SOLUTIONS

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APPENDICES

1. Introduction

Shellbay Holdings Pty Ltd (Proponent) proposes to construct an all weather track along a gazetted road "Doggerup Road" between Windy Harbour Road and Nelson Location 7965 (known as Sandy Peak) on the south coast of Western Australia. 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 the property (Nelson 7965) was freeholded.

The proposal is for the clearing of native vegetation and the construction of a 6.5 km compacted limestone all weather access track from Windy Harbour Road to Nelson Location 7965. The track is to be constructed within a gazetted Road Reserve, Doggerup Road, adjacent to the D'Entrecasteaux National Park, managed by the Department of Environment and Conservation (DEC).

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, which is impassable during winter due to water inundation. Permission to use Wheatley Coast Road is sought from the Department of Environment and Conservation (DEC) via a permit issued annually to the proponent.

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. The proposed track is described as a 12 m wide (6m permanent) clearing within a 20 m wide surveyed road reserve surrounded by Class A Reserve, D'Entrecasteaux National Park. The all weather track is proposed to be 3m wide to enable small amounts of vehicle traffic throughout the year.

1.1. Legislation

This Level 1 Preliminary Fauna Investigation complies with the following agreements and legislation:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Wildlife Conservation Act 1950;*
- *Conservation and Land Management Act 1984;*
- *Environmental Protection Act 1986* (EP Act);
- *Animal Welfare Act 2002;*
- Environmental Protection Authority (EPA) (2004) *Guidance for the Assessment of Environmental Factors, Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia*, Guidance Statement No 56 June 2004;
- EPA Technical Guide *Terrestrial Vertebrate Fauna Surveys for EIA* (2010);
- *The Convention on Wetlands of International Importance* (Ramsar Convention) 1971; and
- *Convention on the Conservation of Migratory Species of Wild Animals* (the Bonn Convention, 1979) published October 2003.

The conservation of fauna species and their significance status is currently assessed under both State and Commonwealth Acts. The acts include the Western Australian Wildlife Conservation Act 1950 (WC Act); Wildlife Conservation (Specially Protected Fauna) Notice 2003, and the EPBC Act. The significance levels for fauna used in the EPBC Act are those recommended by the International Union for the Conservation of Nature and Natural Resources (IUCN). The WC Act uses a set of Schedules but also classifies species using some of the IUCN categories.

1.2. Background Information

The proposal to clear remnant vegetation and construct an all weather access track from Windy Harbour Road to Nelson Location 7965, within the gazetted Doggerup Road Reserve, adjacent to the D'Entrecasteaux National Park. The project was referred to the Environmental Protection

Authority 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 D'Entrecasteaux National Park. The final Guidelines were issued on 9 September 1997. Three draft PER documents were submitted in an effort to meet the requirements specified in the EPA Guidelines. Although the third draft did not adequately address a number of issues, the Chairman agreed that it could be released for public comment on the basis that a copy of the letter from the EPA seeking the review of the then National Parks and Nature Conservation Authority (NPNCA) on the proposal and a copy of the NPNCA's reply to the EPA were included in the PER. 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, including a comprehensive submission from the then Department of Conservation and Management.

On 11 February 1999, while the EPA was in the process of completing its assessment, the proponent attended a meeting with the EPA where they were given the opportunity to present their concerns. These included the EPA's requirement for further survey work and the proponent's opinion that without vehicular access, the density of vegetation prevented a more extensive survey of the flora, fauna and aboriginal heritage sites.

Prior to EPA completing its assessment and providing its report and recommendations to the then Minister for the Environment, and as a result of a misunderstanding, 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 Location 7965. Legal proceedings followed and this led to Shellbay Holdings Pty Ltd subsequently withdrawing the proposal in December 2002.

Shellbay Holding continues to seek legal and secure access to the property and consequently referred a new proposal to construct a road from Windy Harbour Road to Nelson Location 7965 within the gazetted road reserve through D'Entrecasteaux on 13 October 2009.

As a result of this latest application and the subsequent Appeal to the EPA the proponent is addressing the following matters:

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

The EPA has determined that the principle of the conservation of biological diversity and ecological integrity is relevant to the proposal.

This Fauna Assessment report forms a component of the "Public Environmental Review" process.

1.3. Development Proposal

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 an all-weather track along Doggerup Road Reserve:

- 3.0m wide compacted limestone roadbase material track.
- Constructed in summer (dry) conditions, designed to create a low speed environment. The track will not be open to the general public in order to restrict the number of vehicles utilising the track.
- Designated a "Controlled Closed Road".
- The track will consist of limestone roadbase material placed on the existing ground surface and compacted to a minimum thickness of 300mm, this will be subject to Engineering design and further investigations 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 of the track.

- 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.
- The engineering methodology will aim to minimise earthworks and restrict the area of native vegetation and wetland disturbance.

For further detail on the track construction methodology and design, please refer to MPM Development Consultants Engineering Report (2010).

1.4. Scope of Works

The fauna assessment included both desktop and field assessments. The desktop assessment included:

- A review of the DEC Threatened Fauna database and WA Museum NatureMap database;
- A review of the Department of Environment, Water Heritage and the Arts (DEWHA) database for areas listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

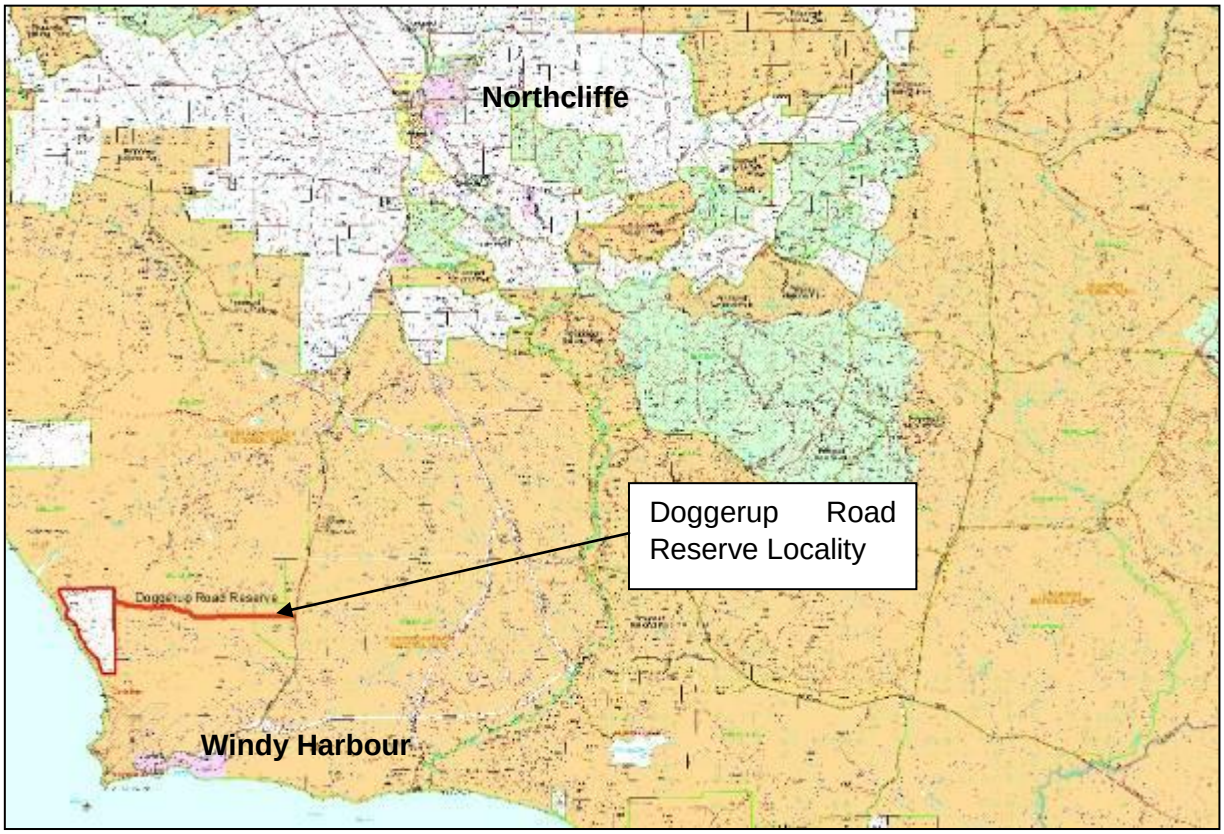
The field survey verified the desktop study and provided a detailed assessment of the existing environment in the survey area and its relationship to adjoining areas. The field survey included:

- An inventory of the vertebrate fauna species in the survey area through targeted searches and opportunistic recording of species;
- A reconnaissance survey for Short Range Endemic mammals;
- Assessment of habitat value and potential future habitat for threatened species;
- The delineation of fauna values present in the area and potential sensitivity to impact;
- A review of the presence and abundance of pest, declared or feral animals; and
- Identification of any habitats of significance.

2. Project Site

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. Geographic cartesian coordinates for the Doggerup Road Reserve are E 409155, N 6150335 at the eastern end connecting Windy Harbour Road and E 415343, N 6149774 at the western end bordering Nelson location 7965. Please refer to Figure 1 Project Locality below and Location Map Appendix A.

Figure 1 – Project locality



The site has been previously disturbed by the formation of the road and drainage (and borrow pits) by the Shire of Manjimup from Windy Harbour Road and from previous clearing disturbance the full length of the 6.5km track. Please refer to Photographs 1 and 2 below.

Photograph 1 right – View of cleared track through low open woodland.
Photograph 2 above – View of borrow pit from road construction and formation by the Shire in the karri forest area of the subject site.

The western end of the track has sustained fire and is varying stages of regeneration, please refer to Photographs 3 and 4 below.

Photograph 3 – View of fire 3-4 year old burnt area in low open *E.marginata* woodland showing regeneration.

Photograph 4 – View of *E.marginata* species with coppice regeneration.

2.1. Geology

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 area traverses 5 Geology Soil and Landscape Map units. Table 1 below outlines the broad scale regional mapping of the subject area in regards to landform, geology and soils. Source of information from DoW Hydrogeology Map Series (DoW 2001) and Regional Soil-Landscape Mapping Shared Land Information Platform (SLIP 2010).

Table 1 – 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

Preliminary site investigation indicates the site is Loams over clay in the east grading to sands over granite and deep sands in the west. Please refer to Photographs 5 and 6 over the page.

Photograph 5 – View termite mound showing grey sands adjacent to granite outcrop.

Photograph 6 – View of loamy soil in the karri forest area from scratching most probably from an echidna.

2.2. Hydrology / Wetlands

The Doggerup Road is located within the Shannon River hydrographic catchment, and within the local catchment of the Gardner River (SLIP 2010). Water within the major wetland areas in and near the project site drain south east towards the Blackwater Creek which feeds into the Gardner River to the south east. The road reserve is surrounded by ephemeral wetland areas that fill after significant rainfall events and then dry out. The Doggerup Creek System comprises extensive flats, Doggerup Lake, Lake Samuel, Lake Florence, Doggerup Creek and a number of unnamed swampy areas.

Project 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).

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) indicate the site is part of the broader Doggerup Creek System (ID WA104), further investigations reveal that the proposed track site is actually located within the Shannon River hydrographic catchment (Department of Fisheries, 2010), and within the local catchment of the Gardner River.

The wetlands in the vicinity of the Doggerup Road Reserve include:

- Permanent rivers and/or streams, less than 1m 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 wetlands within the project site mainly occur over sandy soils with fine layers organic material, some peat is present within deeper portions of the large wetland areas. The water is very coloured due to the presence of tannins from vegetation and is consistent with other wetlands within the region. A number of wet areas towards the eastern end of the road reserve have been created or modified by the Shire of Manjimup some 30+ years ago (pers comms Barry Owen 2011). A burrow pit adjacent to the road reserve near Windy Harbour Road becomes a wetland after significant rain events, but is otherwise dry.

2.3. Topography and Surface hydrology

The Doggerup Road Reserve traverses undulating plains within the 25m and 50m contours. Lowest contours are at 25m in surface watershed areas grading up to 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 "Gardiner River" Local Catchment (SLIP 2010). The subject site is the upper watershed of the Blackwater Creek which is to the south east of the subject area. Blackwater Creek flows to the Gardiner River. Further to the north of the subject area the watershed is towards the Doggerup Creek system. Contour mapping shows that the subject site does not drain to the Doggerup Creek but to the Gardiner River watershed. The Road Reserve traverses 2 seasonal swamps, and minor creeks. These areas are winter wet, and summer dry. Please refer to Photographs 7, 8, 9 and 10 below.

Photograph 7 – View of intermittent swamp 116°037'E 34° 791' (Eastern swamp)

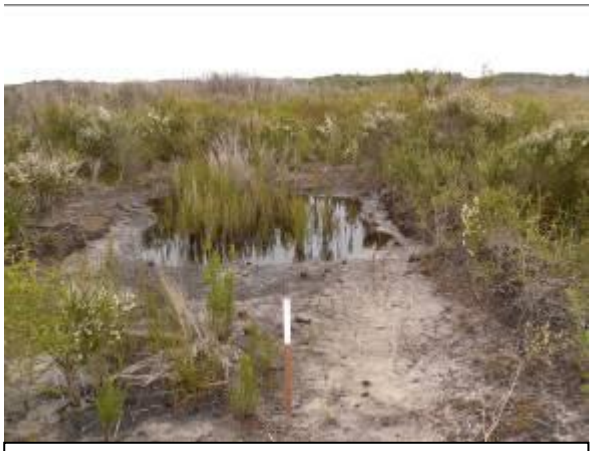
Photograph 8 – View of intermittent swamp 116°037'E 34° 791' (Eastern swamp).

Photograph 9 – View of intermittent swamp 116°034'E 34° 789' (Western swamp)

Photograph 10 – View of seasonal creek adjacent to Karri/Jarrah in the east.

Site assessment over spring (2010) and winter (2011) indicates that the creeks and swamps are dependent on surface catchment and rainfall with water draining rapidly after rain events. Surface water area monitoring commenced in August 2010 marking extent of water cover over the road reserve and project footprint. Please refer to Photographs 11and 12 over the page.

Photograph 11 – View of wet area in Spring 2010, Winter water cover that year was to extent of pegs.



Photograph 12 – View of wet area near intermittent swamp, some pooling occurs from previous disturbance of road/clearing.

All seasonal creek areas were dry to damp upon inspection under late summer conditions (March 2011), and Winter 2011 monitoring revealed that surface water extent had not breached higher than 2010 levels. Please refer to 2011 winter monitoring photos below comparing sites pegged in 2010 (Photographs 13 and 14).

Photograph 13– View of wet area in late winter 2011, Winter water cover was still to extent of pegs placed in 2010. (Compare to Photograph 11).

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

The surface water monitoring to date 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 patterns are not variable between seasons. Surface water monitoring is continuing through to 2012.

There are no open water areas in the large swamp area central to the project site, this is completely covered with emergent vegetation, temporary pools form under precipitation, with small isolated flows only current in winter periods to the south of the subject site.

2.4. Vegetation

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 subject site has been 80% cleared (Road Reserve) to 4m with the remaining edges of the cleared area having 20% intact vegetation. The karri forest has not been logged to local knowledge there is some localised deaths from fire events (K,Kinnear pers obs 2010).

Flora Survey was undertaken in Spring (October 2010) and Summer (February 2011) by Natural Area Consulting, where 9 vegetation types were identified. Please refer to descriptions of the Vegetation types and structure in the following pages.

Unit	Unit Description		Comments
Ed	Tall Closed *Eucalyptus diversicolor* forest over low closed forest of *Allocasuarina decussata, Hovea elliptica, Chorilaena quercifolia* and *Trymalium floribundum.*		
EmCc	Tall Open Forest of *Eucalyptus marginata and Corymbia calophylla* over a Tall Open Scrub layer with *Acacia urophylla, Hibbertia cuneiformis, Hibbertia furfuracea, Sida hookeriana* and *various Thomasia* species.		Photo courtesy of K. Kinnear.

Source: NAC Doggerup Road Reserve Flora Survey (2011)

Unit	Unit Description		Comments
Ed	Tall Closed *Eucalyptus diversicolor* forest over low closed forest of *Allocasuarina decussata, Hovea elliptica, Chorilaena quercifolia* and *Trymalium floribundum.*		
EmCc	Tall Open Forest of *Eucalyptus marginata and Corymbia calophylla* over a Tall Open Scrub layer with *Acacia urophylla, Hibbertia cuneiformis, Hibbertia furfuracea, Sida hookeriana* and *various Thomasia* species.		Photo courtesy of K. Kinnear.

Source: NAC Doggerup Road Reserve Flora Survey (2011)

Unit	Unit Description		Comments
OH	Open Heath of *Anarthria scabrum, Adenanthos obovatus, Acacia pulchella, Acacia hastulata, Calothamnus lateralis, Cyathochaeta clandestina, Dasypogon bromeliifolia, Hakea ceratophylla, Patersonia occidentalis, Diaspasis filiformis* and *Meeboldina denmarkica.*		
Em	Low Woodland of stunted *Eucalyptus marginata* growing over granite with *Anarthria scabrum, Hakea florida, Hakea linearis, Persoonia graminea, Xanthorrhoea preissii, Dasypogon bromeliifolius, Banksia nivea* and *Andersonia sprengelioides.*		Photo courtesy of K. Kinnear.

Source: NAC Doggerup Road Reserve Flora Survey (2011)

Unit	Unit Description		Comments
CTS	Wetland areas with Closed Tall Scrub of *Homalospermum firmum, Rhadinothamnus anceps, Astartea laricifolia, Baumea articulata, Evandra aristata, Meeboldina scariosa, Melaleuca pauciflora, Acacia divergens, Patersonia occidentalis var. occidentalis* and *Hibbertia perfoliata*.		Closed Tall Scrub in the largest wetland area of the survey.
Tf	Old, established dunes with a Low Open Forest of *Taxandria flexuosa* and *Banksia ilicifolia* with and understorey of Tall Open Scrub of *Jacksonia horrida, Acacia Cyclops* and *Macrozamia reidlei*.		*Jacksonia horrida* Tall Open Scrub.

Source: NAC Doggerup Road Reserve Flora Survey (2011)

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

Source: NAC Doggerup Road Reserve Flora Survey (2011)

A copy of the vegetation communities mapping as undertaken by Natural Area Consulting is provided in Appendix B.

2.5. Fauna

Native animal populations have generally been in decline since European settlement (CALM 2005). This is primarily due to native vegetation habitat loss and the introduction of pest animals. Christenson *et al* (1985, 1992) completed surveys across the southern forest regions. Species identified in these surveys (Southern Forests) included mammals such as: phascogales, mardos, dunnarts, a variety of possums, quokkas, bats, bush rats, bandicoots, wallabies and echidnas.

There are at least 21 species of native mammals in the Southern Forests national parks. This includes one pinniped, four macropods, three possums, four dasyurids, one bandicoot, two rodents and six bats. Although it is thought that only three mammals have become extinct within the national parks (the pale field rat *Rattus tunneyi*, the heath rat *Pseudomys shortridgei* and probably Gilbert's potoroo *Potoroo tridactylus gilbertii*, populations of many species are thought to have declined and now exist only as small isolated populations (CALM 2005).

How *et al* (1987) outlined 6 species of mammals recorded or collected within the survey area being – *Macropus fuliginosus* (Western grey kangaroo), *Isoodon obesulus (Southern brown bandicoot), Mus musculus* (Common house mouse), *Rattus fuscipes* (Bush rat), *Falsistrellus mackenziei* (Western false pipistrelle) and *Tarsipes rostratus* (Honey Possum).

Discussion occurred with DEC Fauna specialist Ian Wilson (2010) regarding the possible mammal fauna within the survey area, this included *Isoodon obesulus (Southern brown bandicoot), Psuedocheirus occidentalis*, (Western ringtail possum), *Trichosurus vulpecula* (Brushtail Possum), *Cercartetus concinnus* (Western pygmy possum) and *Tarsipes rostratus* (Honey Possum).

Approximately 135 birds species have been recorded in the southern forests and southern coastal areas by Christenson et al (1985, 1992). The richest assemblages were found in open and low forests and open and low woodlands. Jarrah open woodlands and Karri Type Forests typical to the Northcliffe area support bird species such as cockatoos, parrots, robins, the tawny frog mouth, the Rufus tree creeper and wrens.

Christenson *et al* (1985, 1992) recorded few reptiles for the area, presumably due to low temperatures and higher rainfall. Some species noted during these surveys include: dugite, tiger snake, crowned snake, carpet python, Muellers' snake, Smiths' skink, burrowing skink, Kings' skink and bob tail lizard.

The presence of frogs is highly seasonal; Christenson recorded 17 species known to the area some of these include: burrowing frog, motorbike frog/moaning frog, slender tree frog, green and gold tree frog, and the western banjo frog.

Frogs which are in the regional area include *Litoria adelaidensis* (Slender tree frog), *Litoria moorei* (Motorbike frog), *Crinia georgiana* (Quacking Froglet), *Crinia glauerti* (Glauert's Froglet), *Crinia pseudinsignifera* (False Western Froglet), *Geocrinia leai* (Lea's Froglet), *Geocrinia rosea* (Roseate Froglet), *Heleioporus eyrei* (Moaning Frog) *Heleioporus psammophilus* (Sand Frog), *Limnodynastes dorsalis* (Western Banjo Frog) and possibly *Geocrinia lutea* (Nornalup Frog) and *Spicospina flammocaerulea* (Sunset frog). (ARC 2011).

How *et al* (1987) recorded few frogs within the study area however noted that *"the record of Ranidella subsinsignifera in the Point D'Entrecastueax area is a southwestward extension of its known range while Heleioporus psammophilus has now been shown to occur along Scott river Plains and H.inoratus has been recorded from the Cape Naturaliste Area." (*How *et al* 1987*).*

Native species and introduced species were noted (scats, tracks and visuals) by Bio Diverse Consultants during preliminary site visits to the survey site. This included: crow, blue wren, kookaburra, magpie, tiger snake, western grey kangaroo, echidna, termites, gilgie, southern brown bandicoot, bush rats, ringneck parrot, honeyeaters, kings' skink, and bobtail lizard. A search of the DEC Threatened Fauna Database (as provided by DEC 2010) is in Appendix C.

2.6. EPBC Listed Terrestrial Fauna

It is considered (Ian Wilson 2010) that the Doggerup Road Reserve may contain significant habitat for Quenda (*Isoodon obesulus fusciventer*), Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) and Carnaby's Black Cockatoo (*Calyptorhynchus latirostris*). In addition it was thought that the area may provide habitat for Western Ringtail Possum (*Pseudocheirus occidentalis*) (Pers Comms I.Wilson DEC 2010). The main threats to their survival include fragmentation and loss of habitat through vegetation clearing, fire in fragmented habitat, predation by foxes (particularly in more open habitat), predation of feral cats and dogs.

The Carnaby's Cockatoo is listed as Schedule 1 (Endangered) under the Western Australian Wildlife Conservation Act, and as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999.*

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.

3. Significant Fauna

3.2. Threatened Fauna Desktop Assessment

A search of the DECs Threatened Fauna Database revealed 11 species of terrestrial vertebrate and 2 terrestrial invertebrate Threatened Fauna that have previously been recorded within a 5 km buffer of the project area (Appendix C). This includes 3 species of fish, 4 birds and 3 mammals, 1 crustacean and 1 mollusc. The broader search area includes habitat types not present within the project area. Several of the species listed in these databases would not occur in the project area based on habitat preferences and known distributions. It should also be noted that some of the records are historical and some may now be locally extinct.

A desktop search was undertaken of the subject area with the Department of Environment and Conservation (DEC) Threatened Fauna database. Please refer to Appendix D for the results of this survey.

A summary of the threatened species presumed likely within the study area is provided over the page in Table 2 over the page. The likelihood of occurring is based on the following information:

- Occurrence of suitable habitat within the Doggerup Road Reserve from site survey;
- Other consultants engaged for the Project (Wetland Assessment, Flora Assessment);
- Verbal communication with respected DEC personnel within DEC (Ian Wilson); and
- Current research literature available from public resources.

The DEC Threatened Fauna database revealed 13 species probable within 5km of the survey area. The Western Ringtail Possum is added to list as a possible threatened species given the vegetation types present. No species of frogs are recorded within a 5km buffer of the study area, please refer to Appendix C Threatened Fauna search results.

Table 2 – DEC Threatened Fauna Summary

Species	Common Name	EPBC	Migratory	WAWC	Priority	Likelihood of occurring in subject area
Austroassiminea letha	Cape Leeuwin Freshwater Snail			VU		Low
Calyptorhynchus banksii subsp. naso	Forest Red-tailed Black-Cockatoo	VU		VU		High
Calyptorhynchus baudinii	Baudin's Cockatoo	VU		VU		High
Galexiella munda	Western Mud Minnow			VU		Low
Lagostrophus fasciatus subsp. fasciatus	Bernier Is. Banded Hare-wallaby			VU		Low
Macronectes giganteus	Southern Giant Petrel	VU	X	VU		Moderate
Nannatherina balstoni	Balston's Pygmy Perch	VU		VU		Moderate
Setonix brachyurus	Quokka	VU		VU		High
Isoodon obesulus subsp. fusciventer	Southern Brown Bandicoot, Quenda				5	High
Charadrius rubricollis	Hooded Plover				4	Low
Falsistrellus mackenziei	Western False Pipistrelle				4	Moderate
Galaxiella nigrostriata	Black-stripe Minnow				3	Moderate
Fibulacamptus bisetosus					2	Low
Pseudocheirus occidentalis	Western Ringtail Possum	VU		VU		High

EPBC: Species listed as Schedule 1 in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.
VU: Species listed in Schedule 1 as Vulnerable.
Migratory: Species listed as Migratory in the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999*.
WAWC: Species listed under the Western Australian *Wildlife Conservation Act 1950*.
VU: Species listed in Schedule 1 (Fauna which is rare or likely to become Extinct) as Vulnerable. Species listed under Schedule 4 – Fauna which is Otherwise Specially Protected.
Priority: Species listed as Priority Taxa by the Department of Conservation and Land Management. 4: Species listed as Priority 4 – Fauna in need of monitoring.
PRIORITY CODES:
Priority One: Taxa with few, poorly known populations on threatened lands
Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, active mineral leases. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority Two: Taxa with few, poorly known populations on conservation lands
Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority Three: Taxa with several, poorly known populations, some on conservation lands
Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. The taxon needs urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.
Priority Four: Taxa in need of monitoring
Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
Priority Five: Taxa in need of monitoring (conservation dependent)
Taxa which are not considered threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

3.3. Site Survey

A site assessment was carried out on Tuesday and Wednesday the 2nd and 3rd 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) along the Doggerup Road Reserve track searching for possible habitat trees, Quenda diggings and runnels, cockatoo chewed eucalypt or proteaceous fruit and Ring-tail Possum dreys and scats (Figure 1). All signs and possible habitat trees were recorded with a GPS coordinate.

Survey was undertaken during daylight and night time hours (spotlighting). Field reconnaissance and survey was undertaken for 10m either side of the present track alignment within the Doggerup Road Reserve.

During field survey in February 2011 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 dominat midstorey species were recorded and a database developed for the survey area, please refer to Appendix D. A total of 66 Habitat trees were identified during survey.

4. Habitat values for significant fauna

4.2. Fauna Habitat

Several areas of Good to Very good quality fauna habitat was identified during the site assessment. These areas include habitat for the Quenda as well as other native fauna such as the Echidna (*Tachyglossus aculeatus*), Western Grey Kangaroo (Macropus fuliginosus) Red-eared Firetail (*Stagonopleura oculata*), Rosenberg's Goanna (Varanus rosenbergi) and Bull Skink (*Egernia multiscutata bos*) all of which were identified during the site assessment. The habitat classification used for vertebrate fauna at the site is given in Table 1 below.

Table 1: Habitat classification for vertebrate fauna at Doggerup Road Reserve

Fauna Habitat Classification	Description
Very Good	Vegetation mostly native, all strata intact, a few old tracks that have grown over, a few non-invasive weeds present.
Good	A mix of native and introduced plants, all strata intact, a few tracks that are used occasionally.
Fair	Native vegetation >50% remaining, many weeds present, some bare areas, some used tracks.
Degraded	Less than 30% native vegetation remaining, numerous tracks, cleared areas, soil heaps, ground cover non-existent or > 90% weeds or introduced trees.
Completely Degraded	No vegetation remaining, virtually no habitat for fauna other than human made structures, weeds or introduced trees.

A more detailed assessment of the habitat available for significant fauna follows, a copy of significant trees and habitat is provided in Appendix D.

Quenda, Southern Brown Bandicoot - Isoodon obesulus subsp. fusciventer

Status: Western Australia Priority fauna (P4 – Taxa in need of monitoring):

The walked transect searches yielded 2 sites where signs of Quenda were found (Photograph 13 over the page). The 2 sites (H59 & H58) contained sparse concentrations of recent diggings where

the animals had been foraging for possible worms or larvae. During the site assessment their diggings were distributed mainly around the edges of the Road Reserve in the Very Good to Disturbed (in centre of cleared track) habitat areas.

Photograph 13 – View of diggings by a Quenda, near H59 tree in Karri forest.

The Quenda is an omnivore whose diet includes invertebrates (including earthworms, adult beetles and their larvae), underground fungi, subterranean plant material and, very occasionally, small vertebrates (Braithwaite 1995). The species changes its diet seasonally as different foods become available and they may use other areas of the reserve at different times of year.

Quenda are mainly solitary animals with a male's home range being 2-7ha and a female's 1-3ha depending on the site and resource availability (Braithwaite 1995). It is estimated that approximately 40% of the site (5.2ha) contains suitable Quenda habitat and, given the above home range sizes, between 3 and 6 animals may be resident there. Occasionally they are known to have overlapping home ranges and if this is the case on the reserve the population may be slightly larger.

For shelter during the day the Quenda builds a nest consisting of a heap of ground litter over a shallow depression which provides an internal chamber with loose regions at both ends for entry and exit. These nests can be concealed next to or under logs, shrubs or piles of debris. They will also use old rabbit burrows (Braithwaite 1995).

Spring is the main peak of breeding for Quenda although they can breed throughout the year if conditions are favourable. They have a backward opening pouch which contains eight teats which can accommodates one to six (usually two to four) young in a litter. Two or three litters may be reared in a year, though this is dependent upon food availability. The mortality rate of juveniles is usually high (Braithwaite 1995).

The main threats to their survival include fragmentation and loss of habitat, fire in fragmented habitat, predation by foxes (particularly in more open habitat), predation of young by cats and predation around residential areas by dogs. They are known to survive in areas dominated by weeds and non-native plant species providing the ground cover is of a sufficient density to provide a refuge from predators.

Western Ringtail Possum - Pseudocheirus occidentalis

Status: Wildlife Conservation (Specially Protected Fauna) Notice 2010 - Schedule 1 Vulnerable: EPBC Act - Vulnerable

The searches found no signs of Western Ringtail Possum (dreys or scats), and the habitat was assessed as low quality for them and therefore unlikely to support them.

High quality habitat for the Western Ringtail Possum has been found to comprise a continuous canopy, suitable diurnal refuges, and high foliage nutrient value. Canopy continuity is important as it reduces the need for the animals to come to the ground and thus reduces predation pressure (Jones *et al.* 1994, Richardson 2005).

A 2008 study of the Western Ringtail Possum in the Greater Albany area (Gilfillan 2008) found that, prior to the survey Western Ringtail Possums had been reported using the following plant communities:

- Peppermint (*Agonis flexuosa*) woodlands and thickets,
- Myrtaceous heaths;
- Shrublands;
- Bullich (*Eucalyptus megacarpa*) dominated riparian zones;
- Karri (*E. diversicolor*) forest, and
- Marri (Corymbia *calophylla*)/Jarrah (*E. marginata*) woodlands.

The 2008 Western Ringtail Possum surveys added the following to this list:

- *Allocasuarina fraseriana/Eucalyptus marginata* Low Open Forest over Tall Shrubland, Shrubland, Low Shrubland and Sedgeland;
- *Allocasuarina fraseriana/Eucalyptus staeri* Low Woodland over Open Heath and Mixed Sedgeland;
- *Pericalymma spongiocaule* Open Low Heath over *Tremulina tremula* Sedgeland with emergent *Eucalyptus staeri, and*
- *Allocasuarina fraseriana/Eucalyptus marginata* Low Woodland over *Hakea ferruginea +/- Hakea trifurcata* Open Heath and Mixed Sedgeland.

Of those listed above the only similar plant community present on the reserve that is likely to support Western Ringtail Possums is the Karri (*E.Diversicolour*), Marri (*C.calophylla),* with the coastal *Agonis flexuosa* stunted and sparse in the survey site with low habitat potential . 18 man hours over 2 nights was spent spotlighting along the Doggerup Road Reserve with intense searches at possible habitat trees (Appendix D). No possum species were sighted during the spotlight periods and the trees yielded no visible signs of dreys or activity (dreys or scats).

The known threats to this species survival include fox and cat predation, habitat clearing and fragmentation, fire, climate change and urban development.

Quokka - Setonmix brachyurus

Status: Wildlife Conservation (Specially Protected Fauna) Notice 2010 - Schedule 1 Vulnerable: EPBC Act - Vulnerable

Although numerous on the small offshore islands, it has a very restricted range and is classified as vulnerable. On the mainland, where it is threatened by most introduced predatory species such as foxes, it requires dense ground cover for refuge. Agricultural development has reduced this habitat, and has thus contributed to the decline of the species. Introduced cats and dogs, as well as foxes, have added to the problem, as have the clearing and burning of the remaining swamplands.

The Quokka is most common in dense karri and coastal shrubland communities (Christensen *et al* 1985). The quokka occurs in dense streamside vegetation in a variety of vegetation formations including the karri forest (Christensen 1992). The walked transects did not reveal any signs of the

quokka, although there is Very Good quality of habitat suitable for the species. The regime of fire on the eastern end of the subject area may have caused local numbers to decline or widen their range temporarily. The western end of the subject area has sustained fire, with the creek areas possibly supporting some species, although this is unlikely given the disturbed nature of these.

Forest Red-Tailed Black Cockatoo, Carnaby's Black Cockatoo and Baudin's Black Cockatoo

Status: Forest Red-Tailed Black Cockatoo: Wildlife Conservation (Specially Protected Fauna) Notice 2010 Schedule 1 - Vulnerable: EPBC Act Vulnerable; Carnaby's Black Cockatoo: Wildlife Conservation (Specially Protected Fauna) Notice 2010 - Schedule 1 Endangered: EPBC Act Endangered; Baudin's Black Cockatoo: Wildlife Conservation (Specially Protected Fauna) Notice 2010 - Schedule 1 Endangered: EPBC Act Vulnerable.

One sign of feeding was noted during the assessment by either the Forest Red-tailed Black Cockatoo or Carnaby's Black Cockatoo during the site assessment. The birds were noted to be feeding on a mature Marri (*E.Callophylla*) tree near the Windy Harbour Road. The ground underneath all of the *E. marginata* and *C.callophylla* trees within the Road Reserve were checked for old chewed fruits but none were found other than the one location near Windy Harbour Road.

Sparsely distributed food species from the Proteaceae family were found along the Road Reserve transects (west end) and these were also checked for signs of feeding and none were found.

There are trees in the Doggerup Road Reserve that would be suitable for the nesting hollows for cockatoo species. Each tree was assessed for girth and possible hollows and GPS referenced (Refer to Appendix D). It is not known with certainty if any cockatoo species use the larger trees in the Road Reserve as resting sites while moving to and from feeding and roosting sites in the local area but it is possible.

The main threats to the survival of these species include clearing and fragmentation of habitat (Mawson and Johnstone 1997; Johnstone 1997), loss of Marri trees owing to forestry practices.

Southern Giant Petrel - *Macronectes giganteus*

Status: Western Australia WC Act: Schedule 1; Commonwealth EPBC Act: Endangered.

The Southern Giant Petrel is a marine bird and occurs over open seas and inshore waters in Antarctic and subtropical waters. In summer they occur predominately in sub-Antarctic to Antarctic waters, usually below 60ºS in the South Pacific and south-east Indian Oceans. During winter most adults disperse widely and are rare in the southern waters of the Indian Ocean. The Southern Giant-Petrel breeds on the Antarctic Continent, Peninsula and islands, and on sub-Antarctic islands and South America.

The Southern Giant Petrel may be an occasional vagrant within the project area. The project area did not contain significant habitat for this species.

Hooded Plover - *Charadrius rubricollis*

Status: Wildlife Conservation Act 1950 (WA), Priority 3 species.

The Hooded Plover is predominantly a coastal species inhabiting ocean beaches, coastal lakes and sometimes inland salt lakes in WA (Simpson & Day 1989). Breeding occurs in pairs predominantly on beach disturbed areas, nests are in a depression in the sand usually in association with dry seaweed and located above the high tide area. Plovers are also known to breed in coastal farmlands, with low rates of success due to frequent disturbance from farming practises.

The Hooded Plover is an opportunistic feeder and feeding takes place by day and night according to the availability and behaviour of prey and tidal influences. Their diet consists of insects, amphipod crustaceans (sandhoppers), polychaete worms and small bivalve worms.

The subject site does not support areas of significant habitat for this species. Occasional opportunistic pairs may breed along the disturbed sandy track areas in the west of the subject area but it would be highly unlikely.

Western False Pipistrelle – *Falsistrellus mackenziei*

Status: Wildlife Conservation Act 1950 (WA), Priority 2 species.

The Western False Pipestrelle is a bat living mainly in wet sclerophyll forests of karri, jarrah and tuart Eucalypts. They occupy hollows in old trees, branches and stumps in colonies of 5-30 bats (Australian Museum database accessed 2011). The Western False Pipestrelles eat flying insects caught in spaces between canopy and understorey of tall forests. Per Christensen (1992) outlines that "*..Among the bats Fallistrellus mackenziei occurs throughout the area [Southern Forests] and it is one of the most common bats in the southern forests".*

The eastern end of the subject area supports areas of tall karri (*E.diversicolour*) which would be suitable habitat for this species. Night time and daytime observations did not record any colonies, however calls of bats were noted during the survey in the Karri forest area. This vegetation type is considered to contain areas of significant habitat for this species.

Fibulacamptus bisetosus

Status: Wildlife Conservation Act 1950 (WA), Priority 2 species, IUCN 2011. IUCN Red List of Threatened Species

Fibulacamptus bisetosus is a small crustacean occupying freshwater on granite outcrops. The species is known from one location on Mount Chudalup, in temporary pools on granite. It is unlikely given the disturbed nature of the granite areas within the subject site that this species would occur.

4.3. Other EPBC Act listed threatened or Migratory Species

An assessment has been undertaken of other EPBC Act listed Threatened or Migratory species which the project may impact on. Please refer to Table 3 below.

Table 3 – EPBC Act Listed Threatened Fauna or Migratory Species

Species	Common Name	EPBC Listed	Likelihood of occurring in subject area	Comments
Nanatherina balstoni	Balston's Pigmy Perch	X	Moderate	Probable habitat, engineering design to ensure minimal disturbance to habitat or hydrological regime (refer to MPM Report 2010).
Leipoa ocellata	Malleefowl	X	Low	Unsuitable habitat, prefer semi-arid to arid shrubland and woodland dominated by mallee eucalypts Eucalyptus and/or wattles Acacia
Botaurus poiciloptilus	Australasian bittern	X	Low	Prefers permanent wetlands, site has seasonally inundated wetlands with sparse to no cover
Dioedea exulans gibsoni	Gibson's Albatross	X	Low	Unsuitable habitat (inland)
Macronectes halli	Northern Giant Petrel	X	Low	Unsuitable habitat (inland)
Thalassarche cauta cauta	Shy Albatross	X	Low	Unsuitable habitat (inland)
Dasyurus geoffroii	Chuditch, Western Quoll	X	Low-Moderate	Not recorded within 5km of area, small percentage woodland habitat affected.
Apus pacifilcus	Fork-tailed Swift	X	Low-Moderate	Not recorded within 5km of area, small percentage woodland habitat affected.
Haliaeetus leucogaster	White Bellied Sea Eagle	X	Low-moderate	Unsuitable habitat, no open water, not recorded within 5km of project site
Merops ornatus	Rainbow Bee-eater	X	Moderate	Suitable habitat, not recorded within 5km of project site

4.4. Freshwater fish

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* (Nightfish)
- *Edelia vittata* (Western Pygmy Perch)
- *Galaxias occidentalis* (Western minnow)
- *Lepidogalaxias salamandroides* (Salamander Fish or Mud Minnow)
- *Galaxiella munda* (Western Mud Minnow) (WA Threatened)
- *Galaxiella nigrostriata* (Black-striped Minnow) (WA Priority 3)
- *Nannatherina balstoni* (Balston's Pygmy Perch) (WA & Nationally Rare)

Of these, *Nannatherina balstoni* (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 *Environmental Protection and Biodiversity Act* (1999) (Cwlth).

The Black-Striped Minnow is listed as a Priority 3 species under the *Wildlife Conservation Act* 1950 (WA), 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 *Galaxias munda* (Western Mud Minnow) is listed as Threatened under the WA Wildlife Act 1950. A copy of the DEC Threatened Fauna database search (as provided by DEC 2010) is provided in Appendix C.

A review of freshwater fish species recorded within 5km of the site in the Gardner watershed was undertaken from the historical work by Morgan, Gill and Potter (Morgan *et al* 1998). A total of 6 sites are downstream from the subject area. The following species were recorded by Morgan *et al* (1998):

- *Lepidogalaxias salamandriodes (Ls),* Salamander fish or Mud Minnow;
- *Galaxias occidentalis (Go),*Western minnow or Western galaxias;
- *Galaxias nigrostriata (Gn),* Black-stripe minnow
- *Bostockia porosa (Bp),* Nightfish
- *Edelia vittata (Ev),* Western Pygmy perch or Pygmy perch
- *Nannatherina balstoni (Nb),* Balstons pygmy perch
- *Pseudogobius olorum (Po)*Swan river goby or blue spot goby
- Trout species (non native)

Please refer to Mapping Appendix E for site locations and species recorded.

***Nannatherina balstoni* (Balstons Pigmy Perch)**

Status: *Nannatherina balstoni (*Balston's pygmy perch): Wildlife Conservation (Specially Protected Fauna) Notice 2010 Schedule 1 - Vulnerable: EPBC Act Vulnerable;

Balston's Pygmy Perch inhabits acidic, tannin-stained freshwater pools, streams and lakes in peat flats within 30 km of the coast of south-west Western Australia, preferring shallow water, and commonly associated with tall sedge thickets and inundated riparian vegetation (Allen et al. 2002; Morgan et al. 1998).

The larger wetland areas in and around the gazetted Doggerup Road Reserve are heavily vegetated, with water levels and quantities changing seasonally, contracting and drying during warmer months. Baltson's Pygmy Perch (*Nb*) occurs to the south of the subject area at sites identified by Morgan *et al* (1998). Morgan et al (1998) reported that the centre of the present distribution of *N.balstoni* is the Doggerup, Gardner River and Shannon watersheds. No survey for fish species has been undertaken on the subject site wetlands to date.

There is a moderate risk that this species occurs within the subjects site, however the disturbance is anticipated to be low by this project, the Engineering Specification has been designed to ensure there is minimal footprint of the track and clearing within wetland areas. Hydrological flows are proposed not to be altered to ensure this species is not affected by this project. Please refer to the Environmental Management Plan (EMP) (Kinnear 2011) and the MPM Consultants Engineering Specification (Pippin 2010)

***Galaxiella nigrostriata* (Black-stripe minnow)**

Galaxias nigrostriata, (Black-stripe minnow): Wildlife Conservation Act 1950 (WA), Priority 3 species.

It is possible that the site provides suitable habitat for aestivating fish, such as the Salamander

Fish (*Lepidogalaxias salamandroides*) the Black-striped Minnow (*Galaxiella nigrostriata*) and the Mud Minnow (*Galaxiella munda*). These species typically live in well vegetated, seasonal wetlands, where they are active during winter when water is present, and then aestivate (are dormant) in the sediments during the summer months (Storey, Uni of WA, pers. comm. to NAC, 2010). A visit to the site during February 2011 indicated a small number of fish in the wetland areas still containing water (<10 in total). These were believed to be either the Salamander Fish (*Lepidogalaxias salamandroides*) or the Mud Minnow (*Galaxiella munda*) (NAC 2011).

There is a moderate risk that this species occurs within the subjects site, however the disturbance is anticipated to be low by this project, the Engineering Specification has been designed to ensure there is minimal footprint of the track and clearing within wetland areas. Hydrological flows are proposed not to be altered to ensure this species is not affected by this project. Please refer to the EMP (Kinnear 2011) and the MPM Consultants Engineering Specification (Pippin 2010).

Galexiella munda (Western mud minnow)
Wildlife Conservation Act (WCA) 1950 (WA), Threatened

This species is 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. Please refer to Mapping Appendix E.

4.5. Introduced Fauna

A 5km search of *NatureMap* indicates six species of introduced fauna have been recorded, or potentially occur, within a 5 km buffer of the project area (Appendix C). Evidence of two introduced species was recorded during the field survey, footprints of the cat (*Felis catus)* and the fox *(Vulpes vulpes)* were sighted during the survey.

Table 4 Introduced species that occur, or potentially occur, within the project area.

Scientific Name	Common Name	Recorded during reconnaissance survey
Vulpes vulpes	Fox	Yes footprints
Felis catus	Cat	Yes footprints
Oryctolagus cuniculus	European rabbit	No
Mus musculus	House mouse	No
Rattus rattus	Black rat	No

3. Assessment of Impacts on Fauna

The Doggerup Reserve is contiguous with the native vegetation surrounding the site in the D'Entrecasteaux National Park. The site has been disturbed within the Doggerup Road Reserve to 4 metres along the length of the route. The presently disturbed nature of the current Doggerup Road Reserve (4m) and linear nature of the proposed disturbance could result in disturbance to edges of possible fauna habitats. Native habitat is important for smaller less mobile species, larger more mobile species would use the area moving through the landscape.

The potential impacts associated with the project include:

- **Direct loss and damage to habitat**: Clearing of habitat will be the most direct impact on fauna. However, habitat assessments undertaken during the reconnaissance survey indicate that there is predominantly disturbed areas (previously cleared) with limited suitable (core) habitat for any threatened species that may occur within the project area. Most species would be passing through the road reserve landscape.
- **Direct loss or injury of fauna:** Any construction works have the potential to cause death or harm to fauna species. Vegetation clearing and vehicle movements are likely to result in an increased incidence of animal death or injury. Slower moving land animals (including mammals, reptiles and amphibians) are most at risk, as they are often unable to vacate disturbed areas of vegetation quickly enough to avoid harm. Animals may become disorientated following destruction of their current habitat ranges.
- **Weed introduction and invasion:** Disturbance from the proposed activities has the potential to introduce and/or spread weeds to the area directly impacted by, and adjacent to, the clearing. This may alter remaining and nearby fauna habitat.
- **Soil degradation and erosion:** Native vegetation serves an important role in the stabilisation of soil within the landscape. Removal of vegetation can cause land degradation, including erosion. However, as the amount of clearing required for this project is relatively minimal and is predominantly in or adjacent to previously disturbed areas the potential impacts of soil degradation should be minimal. Steep slopes can result in surface sheet erosion, the landscape is gently undulating and generally flat.
- **Hydrological Changes:** Changes to natural drainage from clearing or other activities may impact on both vegetation structure and fauna habitat in adjoining areas. However, the engineering design specification is such that it should not result in any major changes to natural drainage.

During field survey in February 2011 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 dominat midstorey species were recorded and a database developed for the survey area (refer to Appendix D).

A total of 66 Habitat trees were identified during survey. It is proposed as part of the design of the 3m 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 possible threatened fauna species and habitat.

Two listed (EPBC and WAWCA) fish species have a moderate likelihood of occurring within the project area, the Engineering Specification has been designed to ensure there is minimal footprint of the track within wetland areas. Hydrological flows are proposed not to be altered to ensure these species is not affected by this project. Please refer to the EMP (Kinnear 2011) and the MPM Consultants Engineering Specification (Pippin 2010).

4. Management of Potential Impacts

Impacts on fauna can be minimised and managed by a number of measures which are outlined below:

- Any clearing required should be clearly defined and kept to that which is absolutely necessary.
- Management measures should be implemented to ensure clearing does not cause appreciable land degradation, including preventing erosion from the cleared areas.
- Disturbance of natural drainage channels should be minimised.
- Hydrological flows are to be maintained across all wetland areas, surface water flows are not to be interrupted or disrupted with operations undertaken in driest time of year.
- Management measures should be implemented to minimise the introduction and spread of weeds, such as avoiding movement of soils containing weedy species.
- Management measures should be implemented to prevent impacts on adjacent fauna from pollution, such as litter and oil spills.
- Implement measures to reduce the risk of fire starting from activities at site.
- Destruction of fauna habitat should be minimised during clearing. Dead, standing or fallen timber should be retained as habitat, wherever possible. Where micro-habitats, such as logs and other debris, must be disturbed for construction, these should be retained and used in rehabilitation.

5. Environmental Management

EPA's Guidance Statement No. 43 indicates that where appropriate, the proponent should demonstrate that there is in place an Environmental Management System (EMS) which includes the following elements:

- An environmental policy and commitment to it;
- Mechanisms and processes to ensure:
    - Measurement and evaluation of environmental performance;
    - Planning to meet environmental requirements; and
    - Implementation and operation of actions to meet environmental performance; and
- Review and improvement of environmental outcomes

An Environmental Management Plan (EMP) has been prepared by the proponent in consultation with the Shire of Manjimup and the DEC and includes:

- 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;
- Creation of appropriate management structures and responsibilities including equipment and financial resources;
- Setting of appropriate objectives and targets, including responsibility for achieving these and a time frame in which they are to be achieved;
- Development of corrective and preventative procedures;
- Development of management review and feedback procedures;
- Specific Action Plans including: Weed management, Dieback Management, Revegetation and rehabilitation, Construction Management, Fauna Management, Drainage Management; and
- Environmental review of the potential environmental impacts.

Please refer to the EMP report for further detail (Kinnear 2011).

6. Summary and Conclusions

Shellbay Holdings Pty Ltd proposes to construct a 3m all weather access track 6.5km in length in the Doggerup Road Reserve from Windy Harbour Road to Nelson Location 7965. The Doggerup Road Reserve is surrounded by D'Entrecasteaux National Park which is a Class A Reserve managed by the Department of Environment and Conservation.

A Level 1 Fauna Survey was undertaken to determine the species likely to occur within the subject area and proposed footprint of development. The survey has included desktop assessment of the subject site and site searches undertaken during night and daytime hours. A summary of the findings are as follows:

- The site supports suitable habitat for some listed DEC Threatened Fauna Species, being the Quokka, Southern Brown Bandicoot, Forest Red-Tailed Black Cockatoo, Carnaby's Black Cockatoo and Baudin's Black Cockatoo.
- The site is deemed to have a moderate risk of *Nannatherina balstoni (*Balston's pygmy perch) (Wildlife Conservation (Specially Protected Fauna) Notice 2010 Schedule 1 - Vulnerable: EPBC Act Vulnerable) occurring, however disturbance is anticipated to be low impact;
- The site is deemed to have a moderate risk of *Galaxias nigrostriata*, (Black-stripe minnow): (WAWC Act 1950 (WA), Priority 3 species) occurring, however disturbance is anticipated to be low impact;
- Other Threatened Fauna as listed by the Wildlife Act WA 1950, Commonwealth EPBC Act 1999 and IUCN are considered a low likelihood of occurring or being impacted within the subject site.
- Habitat trees have been tagged and GPS logged to be avoided during all operations of the track formation.
- The Engineering specification (Pippin 2010) demonstrates a methodology which ensures that hydrological function is maintained whilst having a minimal footprint of disturbance.
- A total of 29.5 person hours were spent conducting several walked transects (total 6.5 km) along the Doggerup Road Reserve track searching for possible threatened fauna habitat including habitat trees, diggings and runnels, cockatoo chewed eucalypt or proteaceous fruit and possum dreys and scats. All signs and possible habitat trees were recorded with a GPS coordinate.
- An Environmental Management Plan has been prepared by the Proponent prior to works commencing in consultation with the Shire of Manjimup and the DEC.
- Hydrological regimes will be maintained as per the design detail outlined by the consulting engineers MPM Development Consultants (2010).

It is concluded that the impacts on fauna from the proposed clearing of native vegetation would be localised and not cause fragmentation of fauna habitat due to the linear nature of the disturbance and the disturbed nature of the site presently (fire and cleared vegetation). The Proponent aims to minimise the footprint of the clearing vegetation operations, maintain any hydrological function of surface waters and undertake all operations as documented in the Environmental Management Plan which has been prepared in consultation with the DEC and Shire of Manjimup.

7. References

Abbott, I. 1998. *Conservation of the forest Red-tailed Black-Cockatoo, a hollow-dependent species, in the eucalypt forests of Western Australia. For. Ecol. Manage.*109:175-185.

Australian Museum database accessed 14/9/2011 from:
http://australianmuseum.net.au/

Braithwaite, R.W. 1995. Southern Brown Bandicoot. In R. Strahan (Ed.) *The Mammals of Australia.* Australian Museum and Reed Books. Chatswood, NSW.

Commonwealth of Australia (1996) *The National Strategy for the Conservation of Australia's Biological Diversity.* Department of Environment, Sport and Territories, Canberra, ACT.
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 (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) *Technical Guide – Terrestrial Vertebrate Fauna Fauna Surveys for Environmental Impact Assessment.* September 2010.

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

Gilfillan, S. 2008. *Western Ringtail Possum* (Pseudocheirus occidentalis) *Survey and Data Collation in the Greater Albany Area.* Phase 1 Final Report August 2008. Unpublished report to Department of Environment and Conservation.

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

Johnstone, R. E. and Kirkby, T. 1999. *Food of the Red-tailed Black-Cockatoo Calyptorhynchus banksii naso in south-west Western Australia*. *W. Aust. Nat*. 22:167-178.

Johnstone R.E. and Storr.G.M. 1998 *Handbook of Western Australian Birds.* Volume 1 - Non-passerines (Emu to Dollarbird). Western Australian Museum.

Johnstone, R. E. 1997. *Current studies on three endemic Western Australian Cockatoos*. *Eclectus* 3:34-35.

Jones, B.A., How, R.A. and Kitchener, D.J. 1994. A Field Study of *Pseudocheirus occidentalis* (Marsupialia :Petauridae). II. Population Studies. *Wildlife Research* 21; 189-201.

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

Kinnear, K (2011) *Environmental Management Plan Doggerup Road Reserve*. Unpublished report prepared for Shellbay Holdings Pty Ltd. Bio Diverse Solutions, 55 Peppermint Drive Albany WA.

Mawson, P. and Johnstone, R. E. 1997. *Conservation status of parrots and cockatoos in Western Australia. Eclectus* 2:4-9.

Mawson, P. 1997. A captive breeding program for Carnaby's Cockatoo *Calyptorhynchus latirostris*. *Eclectus* 3:21-23.

Morgan D.L, Gill, H.S and Potter, I.C (1998) *Distribution, identification and biology of freshwater fishes in south-western Australia. Records of the Western Australian Museum Supplement Number 56.* Western Australian Museum, Francis Street, Perth WA.

Natural Area Consulting, *Wetland Assessment Doggerup Road Reserve.* March 2011

Observations from K.Kinnear during field assessment August 2010.

Pippin, C (2010) *Engineering Assessment Doggerup Road, Windy Harbour.* Unpublished report prepared for Shellbay Holdings Pty Ltd. MPM Development Consultants Unit 1/33 Constitution Steet Bunbury WA 6230.

Richardson, J. 2005. *DRAFT Western Ringtail Possum Pseudocheirus occidentalis Recovery Plan, July 2005-June 2010. Version 4.* Department of Conservation and Land Management (now Department of Environment and Conservation).

Saunders, D. A., Rowley, I. and Smith, G. T. 1985. *The effects of clearing for agriculture on the distribution of cockatoos in the southwest of Western Australia.* Pp. 309-321 in *Birds of Eucalypt Forests and Woodlands: Ecology, Conservation, Management*. A. Keast, H. F. Recher, H. Ford and D. Saunders (eds.). RAOU, Melbourne and Surrey Beatty and Sons, Chipping Norton.

Saunders, D. A. 1974. *The occurrence of the Whitetailed Black Cockatoo, Calyptorhynchus baudinii, in Pinus plantations in Western Australia*. *Aust. Wildl. Res.*1:45-54.

Simpson K. and Day N (1989) *The Birds of Australia Second Edition*. Penguin Books Australia, South Yarra Victoria Australia.

Appendices

Appendix A – Location Map

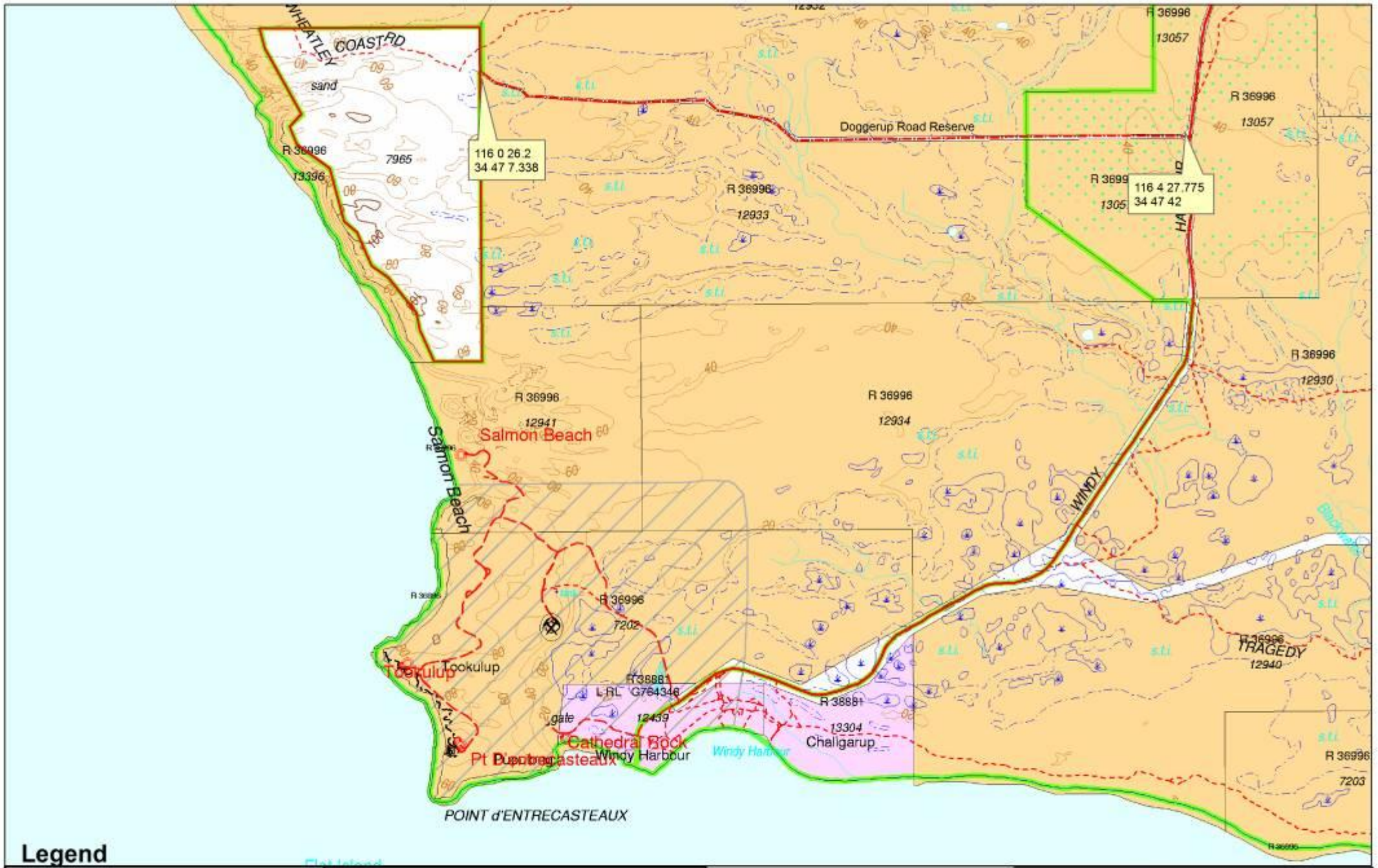
Appendix B – Habitat Trees

Appendix C – DEC Threatened Fauna Search

Appendix D – Habitat Trees Database

Appendix A

Location Map, Doggerup Road


WHEATLEY COAST RD
sand
7965
R 36996
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34 47 7.338
Doggerup Road Reserve
R 36996
13057
116 4 27.775
34 47 42
12933
12930
12941
12934
Salmon Beach
Salmon Beach
WINDY
7202
Tookulup
Tookulup
R 38881
L RL G764346
gate
12439
13304
Challgarup
Cathedral Rock
Windy Harbour
Windy Harbour
Pt Dupont
Pt Entrecasteaux
TRAGEDY
12940
7203
POINT d'ENTRECASTEAUX
Legend
Nelson Location 7965
Road centreline
SCALE
1:30,000 @ A3
0 0.250.5 1 1.5 2 Kilometers
BIO DIVERSE SOLUTIONS
55 Peppermint Drive
Albany, WA 6330
Australia
Tel: 08 9841 3936
Fax: 08 9841 3936
Mob: 0447 555 516
CLIENT Shellbay Holdings Pty Ltd
Doggerup Road
Windy Harbour
Doggerup Road, Windy Harbour
STATUS FINAL
FILE LAND001
DATE 20/9/2010

Appendix B

Vegetation mapping

Natural Area Consulting

Natural Area Consulting
99C Lord St,
Whiteman, WA, 6068
naturalarea.consulting.com.au
08 9209 2767

Figure 4a

Doggerup Road Reserve
- Vegetation Types (west)

Legend

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

Client
Shellbay Holdings Pty Ltd

N

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

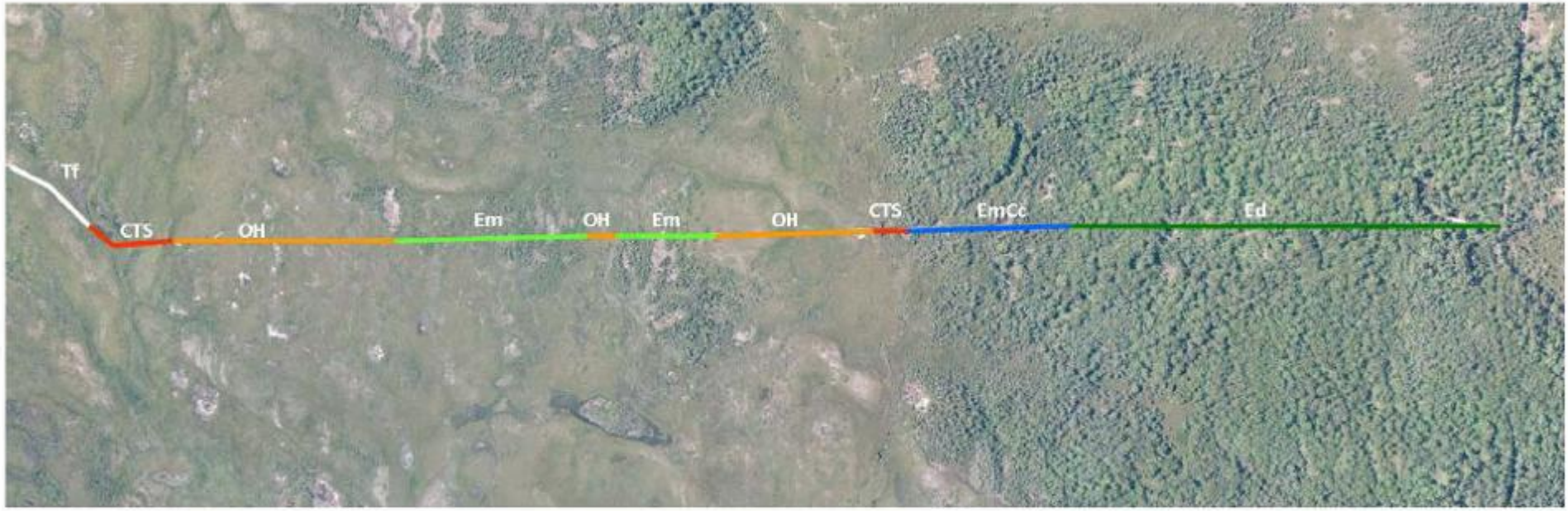


Figure 4b -Vege type.jpg

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

Natural Area Consulting
99C Lord St,
Whiteman, WA, 6068
naturalarea.consulting.com.au
08 9209 2767

Figure 4b

Doggerup Road Reserve
- Vegetation Types (east)

Appendix C

DEC Threatened Fauna

Database Search

Government of **Western Australia**
Department of **Environment and Conservation**

Your ref:
Our ref: 2010/000297 #3462
Enquiries: Amy Mutton
Phone: (08) 9219 8636
Fax: (08) 9334 0278
Email: amy.mutton@dec.wa.gov.au

Bio Diverse Solutions
Attn: Kathryn Kinnear
55 Peppermint Drive
ALBANY WA 6660

Dear Kathryn

REQUEST FOR THREATENED FAUNA INFORMATION

I refer to your request of 30th November for information on threatened fauna occurring in the vicinity of the Doggerup Road reserve study area.

A search was undertaken for this area of the Department's Threatened Fauna database, which includes species which are declared as '*Rare or likely to become extinct* (Schedule 1)', '*Birds protected under an international agreement* (Schedule 3)', and '*Other specially protected fauna* (Schedule 4)'.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the sixth point that refers to the requirement to undertake field investigations for the accurate determination of threatened fauna occurrence at a site. The information supplied should be regarded as an indication only of the threatened fauna that may be present.

An invoice for $200.00 (plus GST), being the set charge for the supply of this information, will be forwarded.

It would be appreciated if any populations of threatened fauna encountered by you in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss threatened fauna management, please contact my Principal Zoologist, Dr Peter Mawson on 08 93340421.

Yours sincerely

A Mutton

.....

for Keiran McNamara
DIRECTOR GENERAL
Department of Environment and Conservation

10 December 2010

Species and Communities Branch
17 Dick Perry Avenue, Technology Park, Kensington
Phone: (08) 9334 0455 Fax: (08) 9334 0278 Teletype: (08) 9334 0546
Postal Address: Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
www.dec.wa.gov.au

NAME	SOURCE_CODE	SOURCE_ID	NAME_ID	FAMILY	GENUS	SPECIES	INFRARAN	INFRA	AUTH	VERNACULAR	KINGDOM	CONSER	NATU	CURREN	SUP_CODE	SITE_NAME	DAY	MONTH	YEAR	LOCALITY	POSTCODE
Austroassiminea letha	TFAUNA	3028	34110	Assimine	Austroassiminea	letha				Cape Leeuwin Freshwater Snail	Animalia	T	N	Y	INVERT	0.8km N of Windy Harbour townsite, in a quarry on S side of track to Salmon Beach.	01	09	1980	WINDY HARBOUR	6262
Calyptorhynchus banksii subsp. naso	TFAUNA	10162	24731	Psittacid	Calyptorhynchus	banksii	subsp.	naso	Gould	Forest Red-tailed Black-Cockatoo	Animalia	T	N	Y	BIRD	Windy Harbour Nth	01	02	1984	WINDY HARBOUR	6262
Calyptorhynchus baudinii	BIRDATLAS2	231610	24733	Psittacid	Calyptorhynchus	baudinii			Lear 1	Baudin's Cockatoo	Animalia	T	N	Y	BIRD	Windy Harbour	19	01	2000	WINDY HARBOUR	6262
Calyptorhynchus baudinii	BIRDATLAS2	789050	24733	Psittacid	Calyptorhynchus	baudinii			Lear 1	Baudin's Cockatoo	Animalia	T	N	Y	BIRD	Mt Chudalup	18	10	2004	WINDY HARBOUR	6262
Calyptorhynchus baudinii	BIRDATLAS2	948207	24733	Psittacid	Calyptorhynchus	baudinii			Lear 1	Baudin's Cockatoo	Animalia	T	N	Y	BIRD	Sunset Lookout	30	12	2007	WINDY HARBOUR	6262
Calyptorhynchus baudinii	BIRDATLAS2	440476	24733	Psittacid	Calyptorhynchus	baudinii			Lear 1	Baudin's Cockatoo	Animalia	T	N	Y	BIRD	Windy harbour	30	09	2000	WINDY HARBOUR	6262
Calyptorhynchus baudinii	BIRDATLAS2	947798	24733	Psittacid	Calyptorhynchus	baudinii			Lear 1	Baudin's Cockatoo	Animalia	T	N	Y	BIRD	Windy Harbour	05	03	2008	WINDY HARBOUR	6262
Galaxiella munda	TFAUNA	9362	34026	Galaxiida	Galaxiella	munda				Western Mud Minnow	Animalia	T	N	Y	FISH	Doggerup Creek Watershed. Pool (2) - Doggerup Creek Track	01	01	1996	WINDY HARBOUR	6262
Galaxiella munda	TFAUNA	12922	34026	Galaxiida	Galaxiella	munda				Western Mud Minnow	Animalia	T	N	Y	FISH	Mount Chudalup	01	01	1977	WINDY HARBOUR	6262
Lagostrophus fasciatus subsp. fasciatus	TFAUNA	9943	24128	Macropo	Lagostrophus	fasciatus	subsp.	fasciatu	(Peron	Bernier Is. Banded Hare-wallaby	Animalia	T	N	N	MAMMAL	Windy Harbour, near Northcliffe	01	01	1970	WINDY HARBOUR	6262
Macronectes giganteus	BIRDATLAS2	238924	24690	Procellar	Macronectes	giganteus			(Gmeli	Southern Giant Petrel	Animalia	T	N	Y	BIRD	Windy Harbour	28	09	1999	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	9501	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Gardner River Watershed. Pool on Windy Harbour Rd	01	01	1996	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	14693	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Gardner River Lake	01	01	1992	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	9497	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Gardner River Watershed. Pool 450 m S of site 13.14	01	01	1996	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	14704	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Mt Chudalup	01	01	1986	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	9494	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Gardner River Watershed. Blackwater - Pool 2	01	01	1996	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	9499	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Gardner River Watershed. Narrow stream on Windy Harbour Rd	01	01	1996	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	9496	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Gardner River Watershed. Pool opposite site 13.13	01	01	1996	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	9500	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Gardner River Watershed. Meandering stream - off Windy Harbour Rd	01	01	1996	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	9495	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Gardner River Watershed. Pool 200 m south of Site 13.10	01	01	1996	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	9493	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Gardner River Watershed. Blackwater - Pool 1	01	01	1996	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	9498	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Gardner River Watershed. Pool 50 m S of site 13.15	01	01	1996	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	14710	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Manjimup	01	01	1992	WINDY HARBOUR	6262
Nannatherina balstoni	TFAUNA	9502	34033	Nannope	Nannatherina	balstoni				Balston's Pygmy Perch	Animalia	T	N	Y	FISH	Gardner River Watershed. Summer pool at western end of site 13.17	01	01	1996	WINDY HARBOUR	6262
Setonix brachyurus	WAMSPECIMENS	M13404	24145	Macropo	Setonix	brachyurus			(Quoy	Quokka	Animalia	T	N	Y	MAMMAL					WINDY HARBOUR	6262
Setonix brachyurus	TFAUNA	9583	24145	Macropo	Setonix	brachyurus			(Quoy	Quokka	Animalia	T	N	Y	MAMMAL	Near Point D'Entrecasteaux	01	01	1985	WINDY HARBOUR	6262
Isoodon obesulus subsp. fusciventer	TFAUNA	9584	24153	Peramell	Isoodon	obesulus	subsp.	fusciver	(Gray	Southern Brown Bandicoot, Quend	Animalia	5	N	Y	MAMMAL	Near Point D'Entrecasteaux	01	01	1985	WINDY HARBOUR	6262
Charadrius rubricollis	TFAUNA	13546	24376	Charadri	Charadrius	rubricollis			(Gmeli	Hooded Plover	Animalia	4	N	Y	BIRD	Salmon Beach near Windy Harbour	21	02	2003	WINDY HARBOUR	6262
Charadrius rubricollis	TFAUNA	13565	24376	Charadri	Charadrius	rubricollis			(Gmeli	Hooded Plover	Animalia	4	N	Y	BIRD	Salmon Beach near Windy Harbour	27	02	2004	WINDY HARBOUR	6262
Charadrius rubricollis	TFAUNA	13564	24376	Charadri	Charadrius	rubricollis			(Gmeli	Hooded Plover	Animalia	4	N	Y	BIRD	Windy Harbour to Cathedral Rocks	23	02	2004	WINDY HARBOUR	6262
Charadrius rubricollis	TFAUNA	11005	24376	Charadri	Charadrius	rubricollis			(Gmeli	Hooded Plover	Animalia	4	N	Y	BIRD	On dunes at Castle Rocks Beach [Cathedral Rocks], Windy Harbour	05	03	2005	WINDY HARBOUR	6262
Falsistrellus mackenziei	TFAUNA	16247	24189	Vespertil	Falsistrellus	mackenziei			Kitche	Western False Pipistrelle	Animalia	4	N	Y	MAMMAL	Windy Harbour, ca 10km N	01	12	2007	WINDY HARBOUR	6262
Falsistrellus mackenziei	WAMSPECIMENS	M21107	24189	Vespertil	Falsistrellus	mackenziei			Kitche	Western False Pipistrelle	Animalia	4	N	Y	MAMMAL	D'ENTRECASTEAUX N.P.	14	03	1985	WINDY HARBOUR	6262
Falsistrellus mackenziei	WAMSPECIMENS	M21108	24189	Vespertil	Falsistrellus	mackenziei			Kitche	Western False Pipistrelle	Animalia	4	N	Y	MAMMAL	D'ENTRECASTEAUX N.P.	14	03	1985	WINDY HARBOUR	6262
Falsistrellus mackenziei	TFAUNA	16246	24189	Vespertil	Falsistrellus	mackenziei			Kitche	Western False Pipistrelle	Animalia	4	N	Y	MAMMAL	Northcliffe-Windy Harbour Rd, 3.2 km S of road to Mt Chudalup	01	12	2007	WINDY HARBOUR	6262
Falsistrellus mackenziei	TFAUNA	3437	24189	Vespertil	Falsistrellus	mackenziei			Kitche	Western False Pipistrelle	Animalia	4	N	Y	MAMMAL	6km S of Mt Chudalup	06	02	1992	WINDY HARBOUR	6262
Falsistrellus mackenziei	TFAUNA	3435	24189	Vespertil	Falsistrellus	mackenziei			Kitche	Western False Pipistrelle	Animalia	4	N	Y	MAMMAL	5km S of Mt Chudalup	13	03	1985	WINDY HARBOUR	6262
Falsistrellus mackenziei	WAMSPECIMENS	M21106	24189	Vespertil	Falsistrellus	mackenziei			Kitche	Western False Pipistrelle	Animalia	4	N	Y	MAMMAL	D'ENTRECASTEAUX N.P.	13	03	1985	WINDY HARBOUR	6262
Falsistrellus mackenziei	WAMSPECIMENS	M21105	24189	Vespertil	Falsistrellus	mackenziei			Kitche	Western False Pipistrelle	Animalia	4	N	Y	MAMMAL	D'ENTRECASTEAUX N.P.	13	03	1985	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	14682	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Lake	01	01	1992	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9537	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Watershed. Pool opposite 13.13	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9533	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Watershed. Blackwater - Pool	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9532	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Doggerup Creek Watershed. Pool (3) - Doggerup Creek Track	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9531	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Doggerup Creek Watershed. Pool (1) - Doggerup Creek Track	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	14668	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River	01	01	1982	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9538	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Watershed. Pool 450 m south of 13.14	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	14667	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River	01	01	1977	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9539	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Watershed. Pool 50 m south of 13.15	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9540	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Watershed. Narrow stream on Windy Harbour Rd	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9534	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Watershed. Pool at southern end of Windy Harbour Rd	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9535	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Watershed. Pool 100 m south of 13.9	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	14674	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Northcliffe	01	01	1986	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9542	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Watershed. Summer pool at western end of 13.17	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9543	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Watershed. Small lake 200 m north of 13.17	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9541	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Watershed. Pool on Windy Harbour Rd	01	01	1996	WINDY HARBOUR	6262
Galaxiella nigrostriata	TFAUNA	9536	34027	Galaxiida	Galaxiella	nigrostriata				Black-stripe Minnow	Animalia	3	N	Y	FISH	Gardner River Watershed. Pool 200 m south of 13.10	01	01	1996	WINDY HARBOUR	6262
Fibulacamptus bisetosus	TFAUNA	6124	33948	Canthoc	Fibulacamptus	bisetosus					Animalia	2	N	Y	INVERT	Mount Chudalup, in temporary pools on granite.	01	01	1987	WINDY HARBOUR	6262

Appendix D

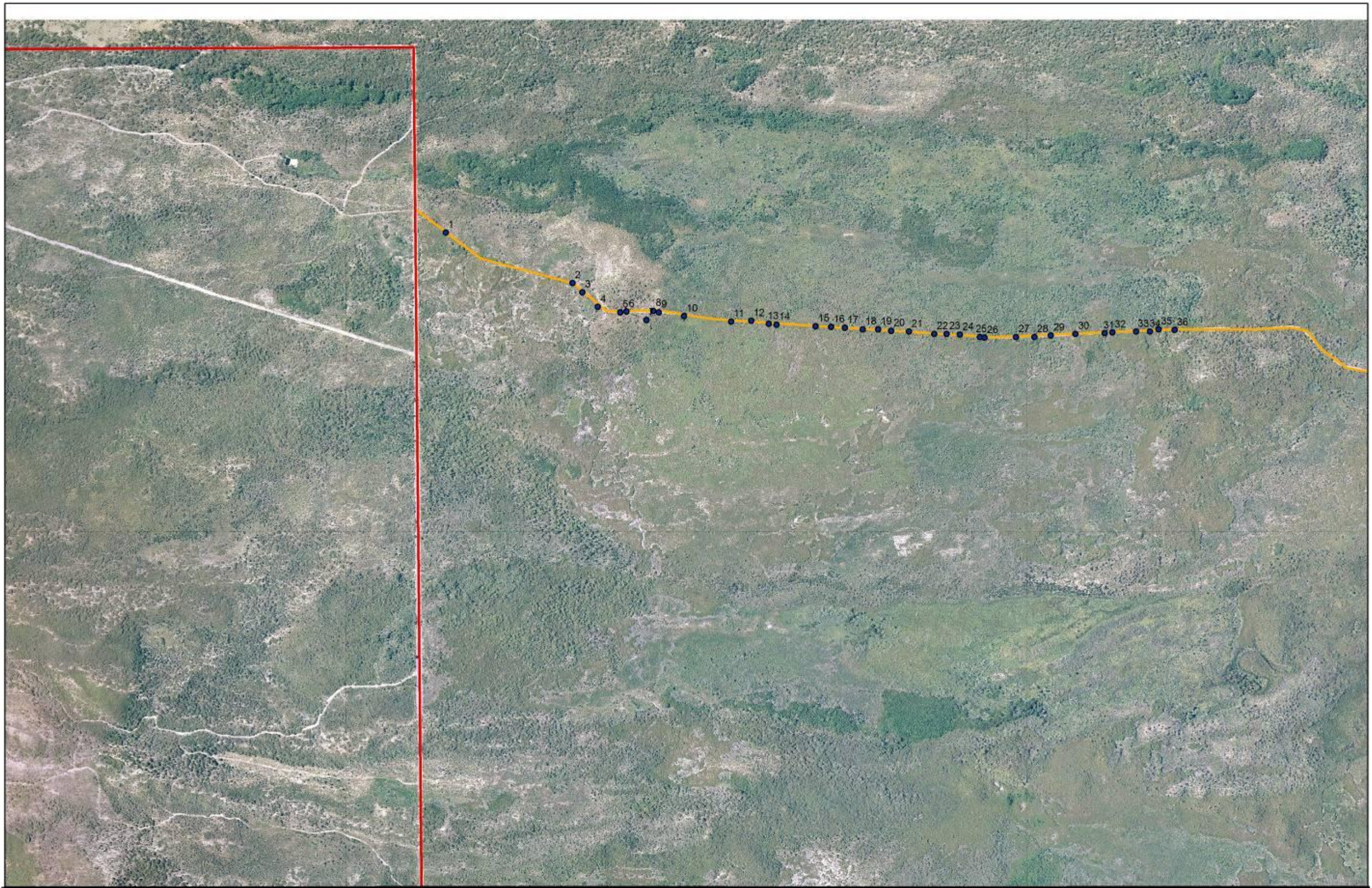
Habitat Trees Database

Map 1.Doggerup Road West

Map 2. Doggerup Road East

Habitat #	GPS Co-ordinates	Tree Species	Height (m)	Dominant mid-story species	Comments
H01	0409222, 6150285	B. Illicifolia x1	4m	Tea tree	South side 9m off track
H02	0409504, 6150172	B. Illicifolia x1	5m	Kunzia Sulphurea, B. quercifolia	South side 5m off track.
H03	0409528, 6150153	B. Illicifolia x3	6m x2	Kunzia Sulphurea, B. quercifolia, Tea tree	South side 2m off track
			5m x1	Kunzia Sulphurea, B. quercifolia, Tea tree	South side 7m off track
H04	0409562, 6150120	B. Illicifolia x1	7m	Kunzia Sulphurea, Tea tree	South side 3m off track
H05	0409610, 6150108	B. Illicifolia x 1	8m	Black boy, Zamia, juvinile peppiments	North side 8m off track
H06	0409625, 6150109	B. Illicifolia x 6	3-4m	Zamia, Black boy, Kunzia Sulphurea	South side 3m off track x2, North side 4m x4
H07	0409663, 6150080	B. Illicifolia x 1	3m	Zamia, Black boy, Kunzia Sulphurea	South side 2m off track
H08	0409685, 6150110	B. Illicifolia x 2	5m x2	Zamia, Kunzia Sulphurea, Jacksonia horrida	South side 7m off track
H09	0409697, 6150108	B. Grandis x1	4m	Leucopogon, Zamia	5m off track
H10	0409755, 6150098	Tax. Juniperina	7m	Tea tree, Illicifolia	4m off track, Dieback demarcation
H11	0409860, 6150085	Raphiophyla	5m	Tea tree, dead Banksias	North side 3m off track
		Tax. Juniperina	8m	Tea tree, dead Banksias	North side 4m off track
H12	0409905, 6150088	B.littoralis x1	3m	Tea tree, Black boy, dead B. quercifolia	North side 4m off track
H13	0409944, 6150083	B.littoralisx1	6m	Black boy, sedges	South side 3m off track
H14	0409961, 6150079	B.littoralis x1	5m	Black boy, Tea tree	South side 5m off track
H15	0410050, 6150077	B.littoralis x1	3m	Black boy, Tea tree	North side 4m off track
H16	0410084, 6150075	B.littoralis x2	5m x1	Blackboy, Teatree	North side 10m off track
			3m x1	Blackboy, Teatree	North side 4m off track
H17	0410114, 6150074	B.littoralisx1	5m	Black boy, Melaleuca	North side 6m off track, 6x Borden/Carnabys heading west
H18	0410155, 6150069	B.littoralisx3	3m x1	Black boy, Tea tree, Kunzia Sulphurea, Melaleuca	3m off track
			6m x2	Black boy, Tea tree, Kunzia Sulphurea, Melaleuca	5m off track
H19	0410189, 6150068	B.littoralis x3	3m x1, 4m x1	Blackboy, Melaleuca	South side 5m off track
			4m	Blackboy, Melaleuca	North side 5m off track
H20	0410215, 6150066	B.littoralisx1	7m	Blackboy, Melaleuca	North side 5m off track
H21	0410256, 6150063	B.littoralis x4	5m x1, 3m x1	Blackboy, Melaleuca	North side 4m and 7m off track
			7m x1, 4m x1	Blackboy, Melaleuca	South side 6m and 5m off track
H22	0410314, 6150059	B.littoralis x8	4m x6	Blackboy, Melaleuca	North side 3-4m off track
			3m x2	Blackboy, Melaleuca	South side 1-2m off track
H23	0410341, 6150060	B.littoralis x3	4-5m x3	Black boy, Melaleuca, Taxandria	3-5m off track
H24	0410370, 6150057	B.littoralisx2	4m x2	Trea tree, Black boy, Eucalyptus	North side 1m and 5m off track
H25	0410414, 6150052	B.littoralis x4	5m x4	Bull rush, Melaleuca, Black boy, Eucalyptus	North side 4m off track x3, South side 6m off track x1
					Some dead Littoralis surrounding.
H26	0410426, 6150050	Melaleuca	10m	Melaleuca, Tea tree, Black boy, dead Banksia	2m off track
H27	0410498, 6150052	B.littoralis x3	5m x5	Bullrush, Teatree, Acacia sp. (Sharktooth)	North side 4m off track x3, South side 5m off track x2
H28	0410539, 6150053	B.littoralis x2	6m x4	Tea tree, Acacia sp. (sharktooth?)	Soth side 1m, 5m x2 and 4m off track
		Taxandria x2	8m x2	Tea tree, Acacia sp. (sharktooth?)	South side 5m x2 off track
H30	0410575, 6150056	B.littoralis x6	5m x3	Melaleuca, Taxandria	North side 1m, 5m and 7m off track

			4m x3	Melaleuca, Taxandria	South side 4m off track
H31	0410630, 6150059	B.littoralis	5m	Melaleuca, Black boy	North side 2m off track
H32	0410695, 6150060	B.littoralisx2	8m x1, 5m x1	Taxandria (thick)	North side 5m and 7m off track
H33	0410711, 6150062	B.littoralis x4	6m x2	Melaleuca, Teatree, Blackboy	South side 6m and 5m off track
			8m x1, 4m x1	Melaleuca, Teatree, Blackboy	South side 3m and 1m off track
H34	0410766, 6150064	B.littoralis x4	7m x1, 6m x1	Tea tree, Black boy	North side 5m off track
			5m x2	Tea tree, Black boy	North side 8m off track
H35	0410797, 6150065	B.littoralis	6m	Tea tree, Blackboy, Taxandria	North side 5m off track
H36	0410816, 6150069	B.littoralis x5	4-5m x5	Kunzia, Taxandria, B.quercifolia, Black boy	North side 3m off track x4, South side 3m off track x1
				2x Wedge tailed eagles in sky	
H37	0410852, 6150067	B.littoralis x1	8m	Kunzia, Black boy	5m off track
		Taxandria x1	6m	Kunzia, Black boy	2m off track
H45	0412704, 6149737	C.Calophylla x 1	8m x1	Granite outcrop, Black boy, Tea tree	North side 3m off track
			6-7m x3	Granite outcrop, fire regrowth, Black boy, Tea tree	South side 5-8m off track
H46	0412821, 6149740	C.Calophylla x 1	8m	Granite outcrop, fire regrowth, Black boy, tea tree	North side 5m off track
H47	0412820, 6149743	C.Calophylla x2	9m x2	Granite outcrop, fire regrowth, Black boy, Tea tree	North side 3m and 6m off track
H48	0412912, 6149743	C.Calophylla x2	9m x1, 10m x1	Granite outcrop, Tea tree, Black boy, dieback demarcation	South side 2m off track
H49	0412955, 6149743	C.Calophylla	9m	Granite outcrop, Taxandria, Black boy	South side 4m off track
H49b	0412955, 6149743	C.Calophylla	10m	Granite outcrop, Taxandria, Black boy	South side 5m off track
H49c	0412955, 6149743	C.Calophylla	10m	Granite outcrop, Taxandria, Black boy	South side 7m off track
H50	0412998, 6149743	E.marginata	7m	Granite outcrop, Black boy, Zamia, juvinile Jarrah	North side 7m off track
H51	0413189, 6149747	C.Calophylla	7m	Granite outcrop, Black boy, Tea tree, fire regrowth, hollows	South side 5m off track
H52	0413217, 6149748	C.Calophylla	6m	Granite outcrop, Black boy, Tea tree, sword grass	North side on edge of track
H53	0413239, 6149744	C.Calophylla	7m	Tea tree beside outcrop, Black boy	South side 5m off track
H54	0413798, 6149760	E.marginata	13m	Tea tree, Hazel,	South side 9m off track
H55	0414018, 6149763	E.diversicolour		Jarrah, casuarinas	South side on edge of track
H56	0414043, 6149765	E.marginata	15m	Bracken, Tea tree, casuarinas, dieback demarcation	South side 7m off track
H57	0414461, 6149760	E.marginata	15m	Bracken, Tea tree, Zamia	North side 8m off track
H58	0414305, 6149759	E.diversicolour	20m	K.Hazel, Acacia	South side 6m off track, Quenda Diggings observed
H58b	0414348, 6149759	E.diversicolour x3	20+m	Hazel, Acacia, Zamia, casuarinas	North side 4m and 6m off track Quenda Diggings observed
H59	0414407, 6149767	E.diversicolour x2	25m x1	Hazel, Acacia, casuarinas	South side 8m off track
			25+m x1	Hazel, Acacia, casuarinas	North side on edge of track
H59b	0414554, 6149769	C.Calophylla	20m	Hazel, Acacia, casuarinas, 1 xdead Karri with hollows	North side 6m off track
H59c	0414652, 6149776	E.diversicolour	25m	Hazel, Acacia, casuarinas, edge of borrow pit	North side 4m off track
H60	0414675, 6149774	E.diversicolour x2	20m x2	Hazel, Acacia, Casuarina	2m and 5m off track
H60b	0414745, 6149771	E.diversicolour	25m	Casuarina, Acacia, Hazel	South side 4m off track
H61	0414772, 6149773	E.diversicolour	25m	Casuarina, Acacia, Hazel	South side 13m off track
H62	0414861, 6149773	E.diversicolour	25m	Casuarina, Acacia, Hazel	South side 2m off track
H62b	0414941, 6149777	E.diversicolour x2	20m x2	Casuarina, Acacia, Hazel	South side 6m off track
H63	0414995, 6149774	E.diversicolour	25+m	Casuarina, Acacia, Hazel	South side 5m off track
H64	0415040, 6149776	E.diversicolour x2	25+m	Casuarina, Acacia, Hazel	North side 4m off track
H65	0415260, 6149776	E.diversicolour	25+m	Casuarina, Acacia, Hazel	South side 3m off track
H66	0415304, 6149773	E.marginata	25m	Casuarina, Acacia, Hazel, Near windy Harbour Rd	North side 3m off track, Baudin Cockatoo feed tree



Legend

- Nelson location 7965
- Windy harbour Road
- Road centreline
- Habitat Tree

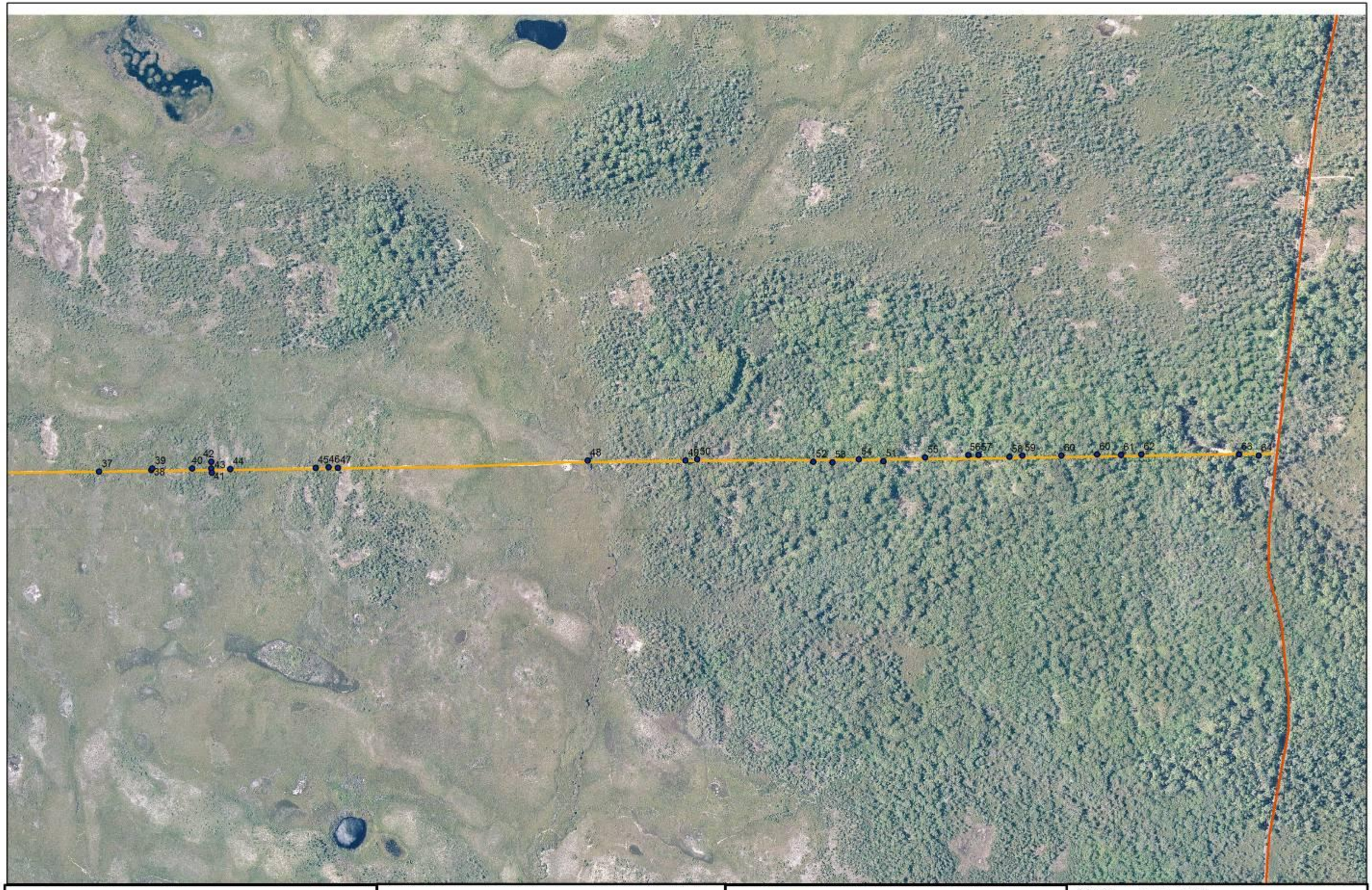
BIO DIVERSE SOLUTIONS

55 Peppermint Drive
Albany, WA 6330
Australia
Tel: 08 9841 3936
Fax: 08 9841 3936
Mob: 0447 555 516

CLIENT: Shellbay Holdings
Doggerup Road
Windy Harbour

Habitat Trees

STATUS	FILE	DATE
Final	Land 001	09/03/2011



Legend

- Nelson location 7965
- Windy harbour Road
- Road centreline
- Habitat Tree

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CLIENT: Shellbay Holdings
Doggerup Road
Windy Harbour

Habitat Trees

STATUS	FILE	DATE
Final	Land 001	09/03/2011

Appendix E

Freshwater Fish Species

From Morgan *et al* 1998

411500 412400 413300 414200 415100 416000

6150000 6149500 6149000 6148500 6148000 6147500

Doggerup Road Reserve

s.t.i.

13057

40

R 36996

13057

HARBOUR

36996

12933

Pool 3 Windy Harbour Rd 12.11 None recorded

Summer Pool at western end of 13.71 13.18 Go, Gn, Bp, Ev, Nb

Meandering Stream off Windy Harbour Rd 13.17 Go, Bp, Ev, Nb

Small Lake 200m north13.17 13.19 Gn, Bp, Ev

Pool off Windy Harbour Rd 13.16 Ls, Go, Gn, Bp, Ev, Nb, Po, Trout sp Ch

Narrow Stream Windy Harbour Rd 13.15 Ls, Go, Gn, Bp, Ev, Nb

R 36996

12934

Legend

- Freshwater Fish, Morgan et al 1998
- Nelson Location 7965
- Contours

SCALE
1:12,000 @ A3

0 0.1 0.2 0.4 0.6 0.8 Kilometers

BIO DIVERSE SOLUTIONS
55 Peppermint Drive
Albany, WA 6330
Australia
Tel: 08 9841 3936
Fax: 08 9841 3936
Mob: 0447 555 516

Shellbay Holdings Pty Ltd
Doggerup Road
Windy Harbour

Freshwater Fish Species Morgan et al 1998

STATUS	FILE	DATE
FINAL	LAND001	29/11/2011

Appendix 9

Aboriginal Heritage and

Native Title

National Native Title Tribunal

Applications and determinations
Home > Applications and determinations > Search applications > Application

Text size A | A Printer friendly

Claimant application summary - South West Boojarah

Application name:	South West Boojarah
Application type:	Claimant application
State or Territory:	Western Australia
Date filed:	25/09/1998
Register of Native Title Claim status:	Not Registered
Federal Court file no:	WAD6279/98
Tribunal file no:	WC98/63
Status:	Finalised - Dismissed
Area description:	South West corner of Western Australia
Approximate area size:	10,072 sq kms
Representative A/TSI body area (s):	South West Aboriginal Land and Sea Council
Local government region(s):	Shire of Augusta-Margaret River Shire of Bridgetown-Greenbushes Shire of Capel Shire of Donnybrook-Balingup Shire of Manjimup Shire of Nannup Shire of Busselton

Was this information useful? Email comments to enquiries@nntt.gov.au

Aboriginal Heritage Inquiry System

Aboriginal Sites Database

Search Criteria

4 sites in a search box. The box is formed by these diagonally opposed corner points:

MGA Zone 50	
Northing	Easting
6146393	407497
6151643	415974

Disclaimer

Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist. Consultation with Aboriginal communities is on-going to identify additional sites. The AHA protects all Aboriginal sites in Western Australia whether or not they are registered.

Copyright

Legend

Restriction

N	No restriction
M	Male access only
F	Female access

Access

C	Closed
O	Open
V	Vulnerable

Coordinate Accuracy

Accuracy is shown as a code in brackets following the site coordinates.

[Reliable]	The spatial information recorded in the site file is deemed to be reliable, due to methods of capture.
[Unreliable]	The spatial information recorded in the site file is deemed to be unreliable due to errors of spatial data capture and/or quality of spatial information reported.

Status

L - Lodged	→	IA - Information Assessed	→	ACMC Decision Made
Information lodged, awaiting assessment		Information Awaiting ACMC Decision Assessment Only		**R - Registered Site** **I - Insufficient information** **S - Stored Data**

***Explanation of Assessment**

Sites lodged with the Department are assessed under the direction of the Registrar of Aboriginal Sites. These are not the final assessment.

Final assessment and decisions will be determined by the Aboriginal Cultural Material Committee (ACMC).

Spatial Accuracy

Index coordinates are indicative locations and may not necessarily represent the centre of sites, especially for sites with an access code “closed” or “vulnerable”. Map coordinates (Lat/Long) and (Easting/Northing) are based on the GDA 94 datum. The Easting / Northing map grid can be across one or more zones. The zone is indicated for each Easting on the map, i.e. '5000000:Z50' means Easting=5000000, Zone=50.

Sites Shown on Maps

Site boundaries may not appear on maps at low zoom levels

List of Registered Aboriginal Sites with Map

No results

Legend

Selected Heritage Sites

- Registered Sites
- Town
- Map Area
- Search Area

List of 4 Other Heritage Places with Map

Site ID	Status	Access	Restriction	Site Name	Site Type	Additional Info	Informants	Coordinates	Site No.
5777	I	O	N	Northcliffe - Isolated Artefacts	Artefacts / Scatter	[Other: 14 isolated artefacts]		415681mE 6150672mN Zone 50 [Unreliable]	S00378
5858	I	O	N	Blackwater, Northcliffe.	Fish Trap, Artefacts / Scatter	Camp, [Other: FOOD RESOURCE]		415639mE 6148647mN Zone 50 [Unreliable]	S00251
20144	L	C	N	Nookanellup Burial Site	Skeletal material/Burial		*Registered Informant names available from DIA.	Not available for closed sites	
21591	L	O	N	Salmon Beach Stone Arrangement	Man-Made Structure, Artefacts / Scatter	[Other: Increase Site]	*Registered Informant names available from DIA.	409367mE 6147043mN Zone 50 [Reliable]	

Legend

Selected Heritage Sites

Other Heritage Places

Town

Map Area

Search Area

Map Showing Registered Aboriginal Sites and Other Heritage Places

Legend

Selected Heritage Sites

- Registered Sites
- Other Heritage Places
- Town
- Map Area
- Search Area