APPENDICES

ENVIRONMENTAL MANAGEMENT PLAN

ARMSTRONG RESERVE, DUNSBOROUGH, URBAN AND COMMERCIAL DEVELOPMENT (MINISTERIAL STATEMENT 1094)

APPENDIX 1

CERTIFICATE OF TITLE
(Source: Department of Lands, 2015)

999L
RAY VILLAGE AGED SERVICES INC
Exam - Post
M924358

WESTERN AUSTRALIA

REGISTER NUMBER	
600/DP403383	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
1	8/4/2015

DUPLICATE CERTIFICATE OF TITLE

VOLUME 2862 FOLIO 254

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 600 ON DEPOSITED PLAN 403383

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

RAY VILLAGE AGED SERVICES INC OF 20 RAY AVENUE, BUSSELTON
(TF M924358) REGISTERED 26 FEBRUARY 2015

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. M924358 CONDITIONAL TENURE LAND. LAND SUBJECT TO CONDITIONS PURSUANT TO S75 LAA. MINISTER'S CONSENT REQUIRED TO TRANSFER OR ENCUMBER LAND. SEE INSTRUMENT M924358 REGISTERED 26.2.2015.

Warning: A current search of the certificate of title held in electronic form should be obtained before dealing on this land. Lot as described in the land description may be a lot or location.

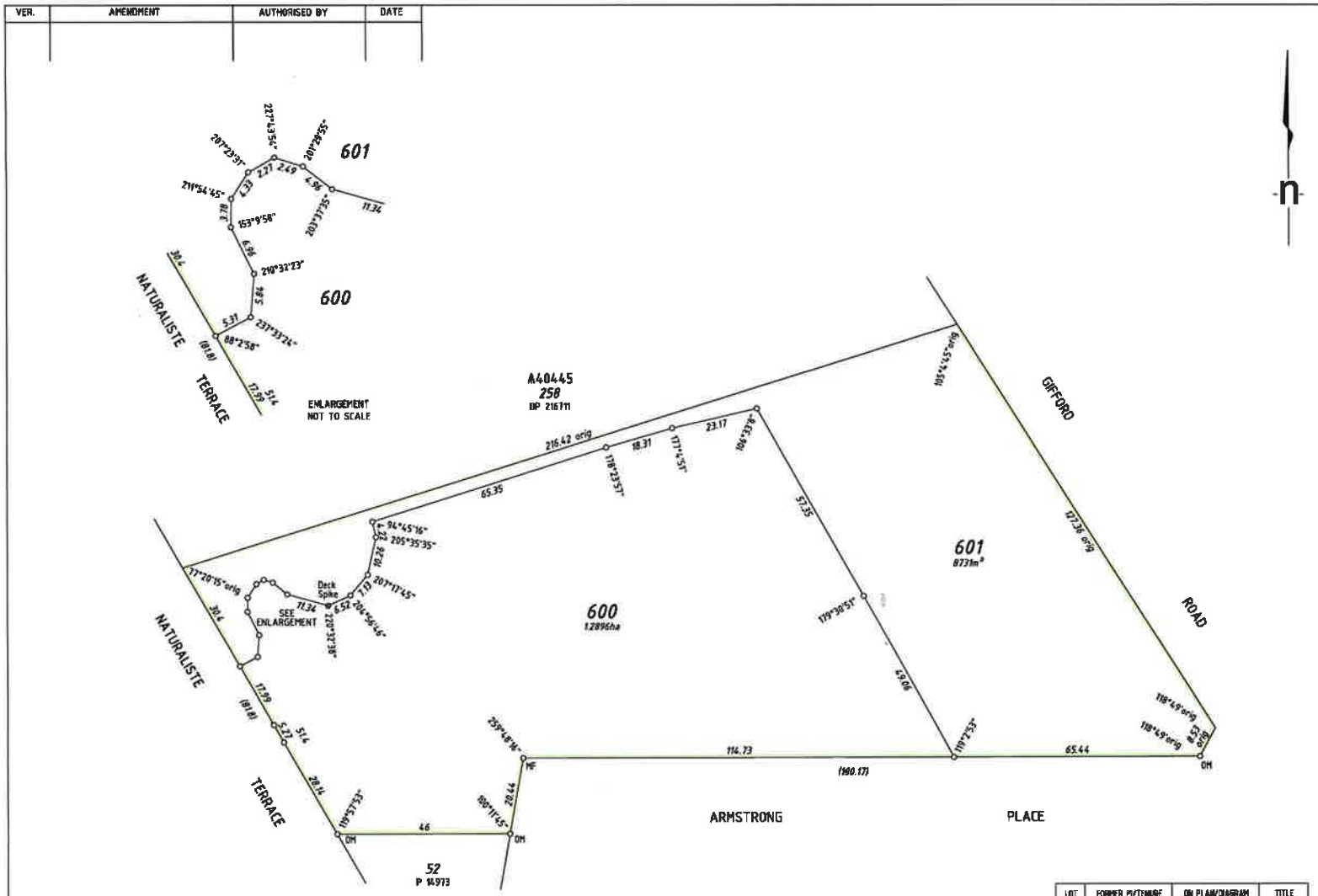
----------END OF DUPLICATE CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	DP403383.
PREVIOUS TITLE:	LR3140-192, LR3164-892, LR3140-193, LR3140-194.
PROPERTY STREET ADDRESS:	NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AREA:	CITY OF BUSSELTON.

VER.	AMENDMENT	AUTHORISED BY	DATE



LOT	FORMER PVTENURE	ON PLAN/DIAGRAM	TITLE
600	Pt LOT 111 Pt LOT 116 Pt LOT 117 Pt LOT 3691 LOT 3692	DP 217005 DP 217005 DP 217005 DP 51275 DP 51275	LR 3149 - 102 LR3149 - 104 LR3149 - 103
601	Pt LOT 111 Pt LOT 116 Pt LOT 117 Pt LOT 3691	DP 217005 DP 217005 DP 217005 DP 51275	LR 3149 - 103 LR3149 - 104 LR3149 - 105

HELD BY LANDGATE IN DIGITAL FORM ONLY.

HD Ref
20180J1-01A
BdR 17/07/14

INTERESTS AND NOTIFICATIONS

SUBJECT	PURPOSE	STATUTORY REFERENCE	ORIGIN	LAND BURDENED	BENEFIT TO	COMMENTS

TYPE CROWN

PURPOSE SUBDIVISION

PLAN OF

LOTS 600 & 601

DISTRICT SUSSEX
TOWNSITE DUNSBOROUGH
FILE D1178-1992
LOCAL AUTHORITY CITY OF BUSSELTON
LOCALITY DUNSBOROUGH
INDEX ON SEE SMARTPLAN

SSA YES/NO
FORMER TENURE SEE TABLE
FIELD BOOK 126872

SCALE: 1 : 750 @ A2
ALL DISTANCES ARE IN METRES 0 10 20 30 40

SURVEYOR'S CERTIFICATE - Reg 54
I, D.P. JOHNSON
hereby certify that this plan is accurate and is a correct representation of the -
(a) *survey; and/or
(b) *calculations from measurements recorded in the field records;
(* delete if inapplicable)
undertaken for the purposes of this plan and that it complies with the relevant written law(s) in relation to which it is lodged.

Licensed Surveyor Date

Harley Dykstra
PLANNING & SURVEY SOLUTIONS
Harley Dykstra
21 Summer Street PO BOX 718 BUNBURY WA 6231
BUNBURY WA 6230 P 08 9792 6000 F 08 9721 3670
W www.harleydykstra.com.au E dhjohnson@harleydykstra.com.au

LODGED
DATE 31-Jul-14
FEE PAID $0.00
ASSESS No. 15668242

TYPE OF VALIDATION
FULL AUDIT
LEGAL COMPONENT RL
DOCKET TRIM
CERTIFIED CORRECT 7-8-14
LSC.
P.S.C.

APPROVED BY WESTERN AUSTRALIAN PLANNING COMMISSION
FILE EXEMPT FROM W.A.P.C. APPROVAL
Delegated under S.16 P & D Act 2005 Date

IN ORDER FOR DEALINGS
SUBJECT TO
Prior Approval of DP51275
Reserve Action

7-8-2014
FOR DIRECTOR OF PLANS & SURVEYS / AUTHORISED LAND OFFICER DATE

APPROVED
26-2-15
DIRECTOR OF PLANS & SURVEYS / AUTHORISED LAND OFFICER DATE

Landgate
Western Australian Land Information Authority

DEPOSITED PLAN
403383

SHEET 1 OF 1
VERSION 1

P403383

Lot Number	Part	Register Number	Section
600		2862/254	

Lot Number	Part	Register Number	Section
601		LR 3164/895	

APPENDIX 2

MINISTERIAL STATEMENT 1094
(Source: Department of Environment, 2019)

Minister for Environment; Disability Services; Electoral Affairs
Deputy Leader of the Legislative Council

Statement No. 1094

STATEMENT TO CHANGE THE IMPLEMENTATION CONDITIONS APPLYING TO A PROPOSAL
(Section 46 of the *Environmental Protection Act 1986*)

ARMSTRONG RESERVE DUNSBOROUGH,
URBAN AND COMMERCIAL DEVELOPMENT

Proposal: The proposal is to develop Lot 600 Armstrong Place, Dunsborough, (formally a 1.28 ha portion of Armstrong Reserve), for the purposes of an aged care facility.

Proponent: Ray Village Aged Services (Inc.) trading as Capecare
Australian Business Number: 77 630 179 279

Proponent Address: 20 Ray Avenue, BUSSELTON WA 6280

Report of the Environmental Protection Authority: 1628

Previous Assessment Number: 1808

Previous Report Number: 1459

Preceding Statement Relating to this Proposal: 926

Pursuant to section 45 of the *Environmental Protection Act 1986,* as applied by section 46(8), it has been agreed that the implementation conditions set out in Ministerial Statement No. 926, be changed as specified in this Statement.

Condition 3 is deleted and replaced with:

3 Time Limit for Proposal Implementation

3-1 The proponent shall not commence implementation of the proposal after 21 January 2023, and any commencement prior to this date, must be substantial.

3-2 Any commencement of implementation of the proposal, on or before 21 January 2023, must be demonstrated as substantial by providing the CEO with written evidence, on or before 21 January 2023.

Published on:

Level 12, Dumas House, 2 Havelock Street, West Perth, Western Australia, 6005.
Telephone +61 8 6552 5800 Facsimile +61 8 6552 5801 Email: Minister.Dawson@dpc.wa.gov.au

Condition 4 is deleted and replaced with:

4 Compliance Reporting

4-1 The proponent shall prepare, submit and maintain a Compliance Assessment Plan to the CEO at least six (6) months prior to the first Compliance Assessment Report required by condition 4-6, or prior to implementation, whichever is sooner.

4-2 The Compliance Assessment Plan shall indicate:

(1) the frequency of compliance reporting;

(2) the approach and timing of compliance assessments;

(3) the retention of compliance assessments;

(4) the method of reporting of potential non-compliances and corrective actions taken;

(5) the table of contents of Compliance Assessment Reports; and

(6) public availability of Compliance Assessment Reports.

4-3 After receiving notice in writing from the CEO that the Compliance Assessment Plan satisfies the requirements of condition 4-2, the proponent shall assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 4-1.

4-4 The proponent shall retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 4-1 and shall make those reports available when requested by the CEO.

4-5 The proponent shall advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.

4-6 The proponent shall submit to the CEO the first Compliance Assessment Report fifteen (15) months from the date of issue of this Statement addressing the twelve (12) month period from the date of issue of this Statement and then annually from the date of submission of the first Compliance Assessment Report, or as agreed in writing by the CEO.

The Compliance Assessment Report shall:

(1) be endorsed by the proponent's CEO or a person delegated to sign on the CEO's behalf;

(2) include a statement as to whether the proponent has complied with the conditions;

(3) identify all potential non-compliances and describe corrective and preventative actions taken;

(4) be made publicly available in accordance with the approved Compliance Assessment Plan; and

(5) indicate any proposed changes to the Compliance Assessment Plan required by condition 4-1.

Condition 5 is deleted and replaced with:

5 Public Availability Data

5-1 Subject to condition 5-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal the proponent shall make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)), management plans and reports relevant to the assessment of this proposal and implementation of this Statement.

5-2 If any parts of the plans and reports referred to in condition 5-1 contains particulars of:

(1) a secret formula or process; or

(2) confidential commercially sensitive information;

the proponent may submit a request for approval from the CEO to not make those parts of the plans and reports publicly available. In making such a request the proponent shall provide the CEO with an explanation and reasons why the data should not be made publicly available.

Condition 6 is added:

6 Residual Impacts and Risk Management Measures

6-1 To mitigate for significant residual impacts of the proposal on a priority ecological community Dunsborough Swamp Forest, threatened and significant fauna species *Pseudocheirus occidentalis* and *Ctenotus ora*, and declared rare flora *Caladenia viridescens*, the proponent shall, prior to the commencement of construction prepare and revise the Environmental Management Plan for the remaining portion of Armstrong Reserve outside the Development Envelope shown in Figure 1, to the satisfaction of the CEO, on the advice of the Department of Biodiversity, Conservation and Attractions (DBCA).

6-2 The Environmental Management Plan required by condition 6-1 shall be prepared in consultation with the City of Busselton and include:

(1) dieback management measures prepared in consultation with the DBCA;

(2) measures to ensure Banksia logs and other woody debris from the clearing in the development envelope are relocated to within the area shown as remaining portion of Armstrong Reserve in Figure 1 to enhance fauna habitat values;

(3) weed control measures;

(4) measures to control vehicle and pedestrian access; and

(5) management measures to ensure impacts from the proposal are contained within the development envelope shown in Figure 1.

6-3 After receiving notice in writing from the CEO that the Environmental Management Plan satisfies the requirements of condition 6-1, prior to the commencement of construction, unless otherwise agreed by the CEO, the proponent shall implement the revised Environmental Management Plan in consultation with the City of Busselton for a period of three (3) years from the commencement of construction.

Hon Stephen Dawson MLC
MINISTER FOR ENVIRONMENT

8 MAR 2019

Schedule 1

Table 1: Summary of the Proposal

Proposal Title	Armstrong Reserve, Dunsborough, Urban and Commercial Development
Short Description	The proposal is to develop Lot 600 Armstrong Place, Dunsborough (formally a 1.28 ha portion of Armstrong Reserve), for the purposes of an aged care facility.

Table 2: Location and authorised extent of physical and operational elements

Element	Location	Authorised Extent
Vegetation Clearing	Figure 1	Clearing of up to 0.90 ha within the development envelope for urban and commercial development and bushfire protection requirements.

Table 3: Abbreviations and Definitions

Acronym or Abbreviation	Definition or Term
CEO	The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the *Environmental Protection Act 1986*, or his delegate.
DBCA	Department of Biodiversity, Conservation and Attractions
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
ha	Hectare

Figure (attached)

Figure 1 Development envelope and remaining portion of Armstrong Reserve.
This figure is a representation of the coordinates described in Schedule 2.

Figure 1 - Development Envelope and Remaining Portion of Armstrong Reserve

Schedule 2

Coordinates defining the development envelope location in Figure 1 are held by the Department of Water and Environmental Regulation, Document Reference Number 2018 – 1530170499215.

APPENDIX 3

DUNSBOROUGH SPIDER ORCHID SURVEY AND DOCUMENTATION
(Source: PGV Environmental, 2014)

5 November 2013

Bernadette van der Wiele

EndPlan Environmental
PO Box 138
North Fremantle WA 6159

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Phone + 61 8 9202 8780
Fax + 61 8 9202 8789
Mob +61 0 427 005 226
Email paul@pgv.net.au
Unit 1, 61 Guthrie Street
Osborne Park WA 6017
ABN 44 981 725 498
Knightside Nominees Pty Ltd

Dear Bernadette,

RE: Armstrong Reserve –2013 Orchid Survey Results

Following are the results of our 2013 survey for the Threatened (Declared Rare) orchid species *Caladenia viridescens* (Dunsborough Spider Orchid) on the Armstrong Reserve site.

Background

In 2012 two separate surveys by the DEC and PGV Environmental identified that up to three individual plants of *Caladenia viridescens* occurred on the Armstrong Reserve site. The proposed development of the Aged Care facility on the reserve is likely to impact on one of the plants recorded and the remainder, at least two or more individuals, should not be impacted. The Proponent committed during the Public Environmental Review to translocate any *Caladenia viridescens* plants that are likely to be impacted by the development. While the GPS co-ordinates of suspected *Caladenia viridescens* plants were recorded, the exact location of plants was not pegged on site. The exact location will be necessary for any translocation exercise as the translocation will need to occur while the plants are not flowering and therefore not visible above-ground.

2013 Survey

Scope of Works

The 2013 survey aimed to confirm the number and accurately identify the location of *Caladenia viridescens* individuals on the site in preparation for their potential translocation prior to development. The survey included the following tasks:

- Undertake a survey in early October;
- Accurately peg the location of individual plants on site;
- Photograph individual plants; and
- Record the location of individual plants on a hand-held GPS.

Results

The survey of the Armstrong Reserve site was undertaken by myself on 11 October 2013 with the assistance of Mr Ron Glencross, a local orchid enthusiast who is very familiar with the orchids of the Dunsborough region and specific localities in and around Armstrong Reserve.

We found four orchid plants which are highly likely to be the Dunsborough Spider Orchid, *Caladenia viridescens*. The orchids were recorded in three locations which are all extremely similar to the locations included in Figure 9 of your Response to Submissions on the Public Environmental Review.

Unfortunately none of the photos taken were of sufficient clarity to include in this report or to verify the identity of the species. However, while a number of similar-looking spider orchid species also occur in the Reserve (Swamp, Tuart and Karri Spider Orchids) the plant recorded at Site 1 (from Figure 9) was the same location as the specimen verified as *Caladenia viridescens* by Dr Andrew Brown in 2012.

The three locations included one plant just inside the development footprint (Site 1 in your Figure 9 from the response to submission). Two plants were recorded next to each other at Site 2 (Figure 9) just outside of the footprint boundary and one was at Site 3 (Figure 9).

The three plants at Site 1 and Site 2 were all marked with a steel tent peg pushed vertically down into the ground. The plant at Site 3 was not marked as it is well outside the development footprint. The tent peg was located 5cm to the south of the flowering stem for the Site 1 orchid and 10cm to the south of the flowering stem for each of the two plants at Site 2.

The location of the marked plants was recorded on a hand-held GPS with an accuracy of 3-8m as follows:

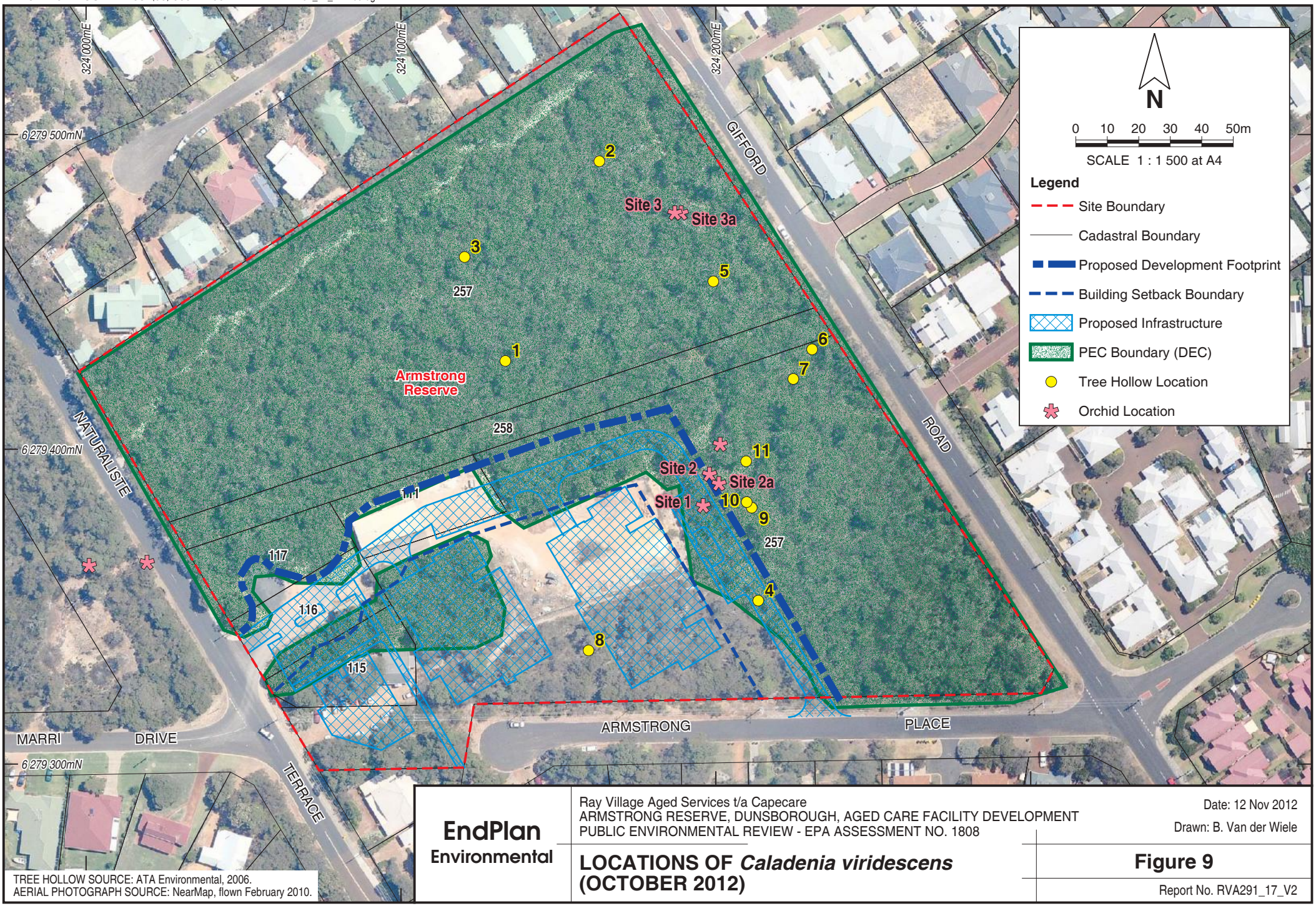
- Site 1 – 50 324187 E 6279398 N
- Site 2 – 50 324200 E 6279404 N

Please contact me if you require any further information on this matter.

Yours sincerely

Paul van der Moezel
Managing Director

PINPOINT CARTOGRAPHICS (08) 9562 7136 RVA291_17_V2-F09.dgn



TREE HOLLOW SOURCE: ATA Environmental, 2006.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown February 2010.

EndPlan Environmental

Ray Village Aged Services t/a Capecare
ARMSTRONG RESERVE, DUNSBOROUGH, AGED CARE FACILITY DEVELOPMENT
PUBLIC ENVIRONMENTAL REVIEW - EPA ASSESSMENT NO. 1808

LOCATIONS OF *Caladenia viridescens* (OCTOBER 2012)

Date: 12 Nov 2012
Drawn: B. Van der Wiele

Figure 9

Report No. RVA291_17_V2

Department of
Environment and Conservation

APPLICATION FOR A PERMIT TO TAKE DECLARED RARE FLORA IN NON-DEPARTMENTAL MANAGEMENT OPERATION

(Pursuant to Section 23F of the *Wildlife Conservation Act 1950*, as amended)

NOTE TO ALL APPLICANTS:

- Please complete ALL sections. Further information may be obtained from the Department's Flora Administrative Officer, 9334 0422.
- In this application form DRF = Declared Rare Flora (also referred to as Threatened Flora)
- **Completed Application should be forwarded to;**

  Flora Administrative Officer, Species & Communities Branch, Department of Environment & Conservation (DEC), Locked Bag 104, Bentley Delivery Centre, WA 6983. Or emailed to kelly.griffiths@dec.wa.gov.au.

1. **Scientific name(s) of DRF to be taken (if more than one taxon please list all):**

   Caladenia viridescens_____

   _____

2. **Date(s) of the proposed activity which will result in taking of DRF:**

   April 2014_____ to June 2014_____

3. **Nature of the proposed activity:**
   Note: If renewing a DRF permit, include details here of what was taken under the previous permit & why you require the permit to be renewed.

   Translocation of one plant from one part of Armstrong Reserve approved for development to elsewhere in the Reserve that will be protected as a conservation reserve. Site 1 on attached plan is the location of the plant to be removed. Site 2 is the translocation site. Site 3 is a back-up if Site 2 is deemed to be unsuitable at the time of planting._____

   _____

   _____

4. (i) **Location of proposed activity:**

   Armstrong Reserve, Naturaliste Terrace, Dunsborough (Reserve R25229)_____

   _____

   _____

4. (ii) **DEC Population Number/s of the DRF:** No current number _____

5. (i) **Purpose of and need for the proposed activity:**

   The proposal to develop an aged care facility on Armstrong Reserve was approved by the Minister for the Environment on 21 January 2013 (Ministerial Statement 926). The approval allowed the development footprint to impinge on one plant of Caladenia viridescens. The

Government of **Western Australia**
Department of **Parks and Wildlife**

WILDLIFE CONSERVATION ACT 1950 AS AMENDED - SECTION 23F

PERMIT TO TAKE DECLARED RARE FLORA

The undermentioned person may take declared rare flora for the purpose described, subject to the terms and conditions of this permit. Note: In this permit DRF = Declared Rare Flora.

1. PERMIT NO: 156-1314
2. PERMIT HOLDER: Dr Paul van der Moezel
   ADDRESS: PGV Environmental
   1/62 Guthrie Street
   Osborne Park WA 6017

3. DESCRIPTION OF PLANT

   3.1 SCIENTIFIC NAME: *Caladenia viridescens*.

   3.2 PARTS TO BE TAKEN: Whole plant and soil stored seed.

   3.3 QUANTITY: 1 whole plant and an unknown number of dormant plants and soil stored seed (see conditions 8.1 & 8.2).

4. PURPOSE OF TAKING: Development of aged care facility on Armstrong Reserve (Ministerial Statement 926),

5. METHOD OF TAKING: Mechanical and by hand.

6. AREA TO WHICH PERMIT RELATES: Armstrong Reserve, Naturalist Terrace, Dunsborough; location shown on map provided with application received 25 February 2014).

7. PERIOD FOR WHICH PERMIT IS VALID: From date of signature below to 30 June 2014.

8. CONDITIONS:

8.1 The number of DRF should be limited to that detailed in 3.3 above. If a larger quantity of material is required, a further application shall be made to the Director General, Department of Parks & Wildlife, setting out specific details.

8.2 This permit also covers the taking of the plant subject to this permit as a salvage/translocation into the adjacent Armstrong Reserve, to be undertaken by carefully excavating the plant using a sharp edged square spade and removing, as a block, one spade width and 2/3 of spade depth of soil surrounding the plant, and transplanting it to a suitable location within the existing population in Armstrong Reserve.

8.3 Following translocation, the plant is to be protected from herbivory with a small mesh fence and flagged for ongoing monitoring.

8.4 Hygiene measures are to be undertaken when entering DRF habitat to minimise the risk of introduction or spread of weeds and disease

8.5 The Permittee must notify the local Flora Conservation Officer (Ph. 9752 5555) prior to the works and translocation being undertaken so they can be present to assist at the time of translocation.

8.6 This permit also covers the activities of other persons involved in the activity under the supervision of the permit holder.

8.7 No original DRF material "taken" during the activities shall be used for commercial purposes.

8.8 The location of DRF populations shall be treated as confidential and under no circumstances disclosed to other persons not involved in the project, without the written permission of the Director General, Department of Parks & Wildlife.

Please note: conditions are continued on page 2 of DRF Permit No. 155-1314

MB
.....
(Delegates initials)

Phone +61 8 6500 8801
Mob +61 0 427 005 226
Email paul@pgv.net.au
Unit 1, 61 Guthrie Street
Osborne Park WA 6017
ABN 44 981 725 398
Knightvale Nominees Pty Ltd

11 June 2014

Janine Kuehs

Acting Flora Administrative Officer
Species and Communities Branch
Department of Parks and Wildlife
Locked Bag 104
Bentley Delivery Centre WA 6983

Dear Janine,

RE: DRF Permit No. 156-1314

In accordance with Condition 8.10 of my permit to take Declared Rare Flora (Permit No. 156-1314) I wish to advise you of the translocation of one plant of *Caladenia viridescens* within Armstrong Reserve.

The translocation was undertaken on 6 June 2014 with the assistance of the Local Flora Conservation Officer, Ben Lullfitz. The location of the plant to be relocated was marked with a tent peg in 2013 while the plant was flowering. A *Caladenia* leaf was growing in exactly the same place as marked in 2013 and was therefore considered to emanate from the same plant.

Prior to excavation a relocation site was decided on within Armstrong Reserve approximately 50m to the north of the plant to be excavated. The site chosen was at co-ordinates 324212 E 6279400 N using a hand-held GPS with an accuracy of 3-10m. The site was chosen for the following reasons:

- The site is outside the development footprint of the Aged Care Facility to be constructed in the reserve;
- The vegetation type was the same as in the original location (*Corymbia calophylla, Agonis flexuosa, Jacksonia floribunda*);
- The soil type was the same grey, moist sand;
- Two other plants of *Caladenia viridescens* are known to occur within 15m of the location; and
- The site is accessible for monitoring but not readily visible from any tracks within the reserve.

10 November 2014

pgv ENVIRONMENTAL

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ABN 44 981 725 488
Knightsbridge Nominees Pty Ltd

Janine Kuehs

Acting Flora Administrative Officer
Species and Communities Branch
Department of Parks and Wildlife
Locked Bag 104
Bentley Delivery Centre WA 6983

Dear Janine,

RE: DRF Permit No. 156-1314

In accordance with Condition 8.11 of my permit to take Declared Rare Flora (Permit No. 156-1314) I wish to advise you of the monitoring results of one plant of *Caladenia viridescens* within Armstrong Reserve, Dunsborough.

The translocation was undertaken on 6 June 2014 as reported to DPaW on 11 June 2014. The plant was protected by placing a small mesh fence around four short pickets.

The translocation site was inspected on 10 October 2014 by me. I am pleased to advise that the translocated plant was in full flower on that date and in good health (Plate 1).

Plate 1 Translocated Orchid – 10 October 2014

As per condition 8.11 of the Permit the orchid will be monitored again in the 2015 flowering season. A decision to remove the wire mesh will be made during the 2015 inspection.

Please contact me if you require any further information.

Yours sincerely

Paul van der Moezel
Managing Director

cc. Mark Sheldon-Stemm CEO, Cape Care

A hole was dug in the relocation site approximately 30cm x 30cm square and 30cm deep prior to excavation of the orchid.

A 30cm x 30cm x 30cm sod of earth including the orchid was excavated using a new, clean square spade. All plant and leaf matter, including the in-situ peg was transferred on the spade to the new site (Plate 1). The moisture of the sand allowed the sod to be moved as one with very little to no soil loss during the transferral.

The sod was placed into the previously dug hole and leaf litter replaced over any areas of bare sand. The location peg remains at 5cm to the south of the leaf. A small mesh fence was wired in place around four short pickets to protect the plant from herbivory (Plate 2). It should be noted that the *Caladenia* leaf translocated already showed some signs of herbivory at the top of the leaf. As it is still early in the growing season for the orchid is was considered possible that the leaf could recover from the early grazing and still produce a flower in the 2014 season. If not, it may be possible that it would flower in 2015.

As per condition 8.11 of the Permit the orchid will be monitored in the 2014 and 2015 flowering seasons.

Plate 1 Orchid Translocation

Plate 2 Translocation Site

If you have any queries please contact the undersigned.

Yours sincerely

Paul van der Moezel
Managing Director

cc. Mark Sheldon-Stemm CEO, Cape Care

Permit conditions continued – DRF Permit No. 155-1314

8.9 The Department reserves the right to remove any other material of this DRF as considered necessary from the site prior to the commencement of works.

8.10 The Permittee shall advise the Flora Administrative Officer, Species & Communities Branch if the taking has been completed within one month of the expiry of this permit.

8.11 Post translocation, monitoring will initially be conducted annually for two years during the flowering time of the species.

8.12 Copies of any report or publication (including monitoring reports), on DRF covered by this permit shall be provided to the Director General, Department of Parks & Wildlife via the Flora Administrative Officer, Species & Communities Branch.

8.13 The permit holder shall produce this permit whenever requested to do so by a Wildlife Officer, or by any person appointed by the body or authority which has the care or control of the land from where the DRF is taken, together with any other approval letters that may be in force during the period of this permit.

Margaret Byrne

DELEGATE OF THE MINISTER FOR ENVIRONMENT
(in accordance with section 133(1) of the CALM Act 1984)

DATE: ....11...../.....5...../2014

Proponent committed to translocating the plant prior to development.

(ii) **Consequence of not carrying out the operation:**

The one plant will not survive.

6. **Cost of alternative measures (eg, to exclude DRF from burning; include any change in fire risks):**

Options to move the development footprint to avoid the plant were considered during the EPA assessment. No viable alternative footprint was found. .

7. **Total number(s) and condition of plants in DRF population(s) subject to the proposed activity (include reproductive maturity):**

One plant in good condition.

8. **Number(s) of plants and parts of plants likely to be taken (e.g. leaves, flowers, fruits, seeds on ground, stem, roots, above ground plants, whole plants) at the time proposed:**

One plant, bulb to be taken and transplanted.

9. **Number of populations, number of plants and condition of the species on all other lands in the Shire and/or DEC District:**

Six populations known in the Dunsbourough region (Interim Recovery Plan). Total number of plants variable depending on year of survey. Probably around 100 plants in total.

10. **Detail regenerative characteristics of the DRF, e.g. recovery after fire:**

Caladenia viridescens is an orchid which has a growing phase from March through to late November. Single leaf appears following the first seasonal rains. Replacement tuber initiated during winter and continues to develop until late in the growing season. Flowers mid-September to late October.

11. **Detail proposals for monitoring the effect of the activity on the DRF:**

Surveys will be undertaken during the flowering period of the orchid (mid-Spetmeber to late October) in the first two years after transplanting.

12. **Other relevant information (eg discussion with DEC District staff, Species and Communities Branch or Research Division):**

Discussions have been held with Andrew Webb (DPaW) and Mark Brundredt (DPaW) regarding the method and timing of translocation and the preferred translocation site (see attached email). The proposed method is to carefully dig up the orchid while it is still dormant, ideally in autumn, transfer the plant to a pot to be held at the local orchid society premises and re-plant into an existing population approximately 20m away from the extraction site. The translocation would be done in September when other Spider Orchids are flowering to avoid any loss of existing plants.

13. **Additional comments in support of application:**

14. Applicant Details (Name of the individual to whom a permit is to be issued):

Surname Dr van der Moezel	Other Names Paul Gerard	
Personal (residential) or Research Institution/Company/Group Address 93 Burniston Street Scarborough		Postcode 6019
Address (postal) 1/61 Guthrie Street, Osborne Park		Postcode 6017
Associated Research Institution/Company/Group (if applicable)		Day Phone No. 0427 005 226
Previous Permit No.: Expiry Date: ..... / /	Email Address: paul@pgv.net.au	

15. Threatened Flora Report Form:

Please attach a copy of a recent Threatened Flora Report Form relating to the species/population described in 1 and 4 above. (NB: an inspection of the site may be required)

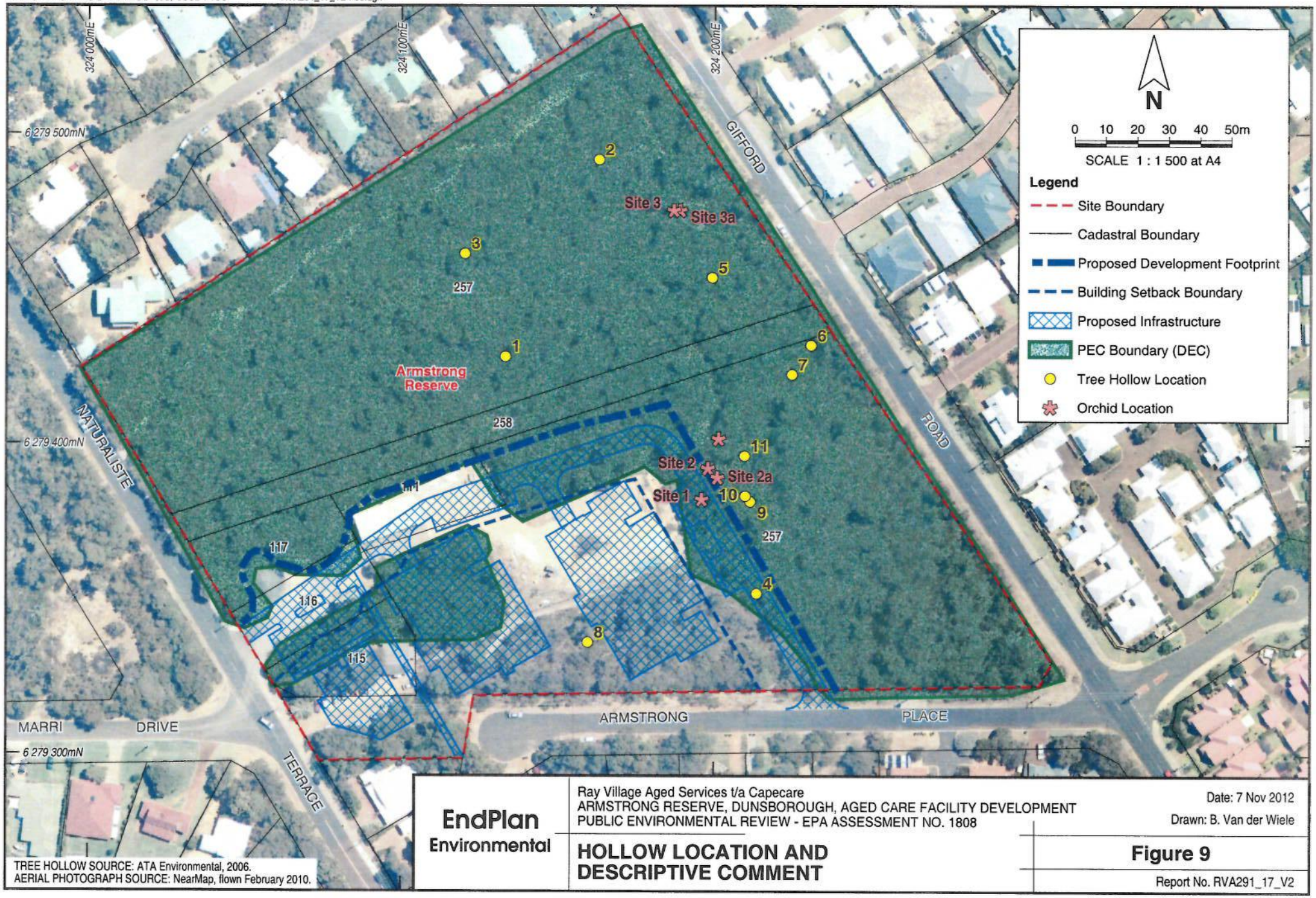
16. Signed _____ **Date:** 25 / 2 / 14

Note:

- Applications to take Declared Rare Flora must be submitted at least 4 weeks prior to the "taking" of the species.
- "to take" in relation to the Wildlife Conservation Act includes to gather, pluck, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means.
- All applications must be referred in the first instance for the attention of the Administrative Officer Flora, Species and Communities Branch, Department of Environment & Conservation, Locked Bag 104, Bentley Delivery Centre WA 6983. A submission will be forwarded to the Hon Minister for the Environment (or their delegate), based on this application.
- Applicants must complete all sections. Contact the Department's Flora Administrative Officer 9334 0422 if further information is required.
- Submission of Threatened Flora Report Forms relating to the species collected are to be submitted to DEC as per permit conditions.
- A list of the current DRF can be obtained from http://www.dec.wa.gov.au/management-and-protection/threatened-species/listing-of-species-and-ecological-communities.html

Revised: Dec 2012

PINPOINT CARTOGRAPHICS (08) 9562 7136 RVA291_17_V2-F09.dgn



TREE HOLLOW SOURCE: ATA Environmental, 2006.
AERIAL PHOTOGRAPH SOURCE: NearMap, flown February 2010.

EndPlan Environmental

Ray Village Aged Services t/a Capecare
ARMSTRONG RESERVE, DUNSBOROUGH, AGED CARE FACILITY DEVELOPMENT
PUBLIC ENVIRONMENTAL REVIEW - EPA ASSESSMENT NO. 1808

HOLLOW LOCATION AND DESCRIPTIVE COMMENT

Date: 7 Nov 2012
Drawn: B. Van der Wiele

Figure 9

Report No. RVA291_17_V2

Paul van der Moezel

From: Webb, Andrew <Andrew.Webb@DPaW.wa.gov.au>
Sent: Monday, 24 February 2014 9:15 AM
To: Paul van der Moezel
Cc: Hanly, Peter
Subject: RE: Armstrong Reserve orchid translocation

Hi Paul,
I'm not sure exactly where this translocation plant is to be taken from, but I imagine it is from near the eastern edge of the existing Shire depot ?, if that is the case then I would recommend relocating the plant approximately 5-10m east of its current location so that it stays within the existing larger population in that same area.

This as you say would not compromise any genetic diversity and should maximise the chances of the plant staying in soil with suitable mycorrhizal fungal associations to help ensure both its survival and the germination of any seed it may drop.

I'm not too sure of what translocation method you are looking to propose, but with translocation within an existing population as I have mentioned above, the relocation would have to be at a time when above-ground parts of orchids are showing to ensure that the translocation does not result in the loss of existing plants. We have in some previous translocations held plant in pots to ensure that relocations are done at a suitable time to avoid other plant loss.

As I imagine you are fully aware the relocation I have mentioned above is only a recommendation to assist with the development of your translocation/salvage proposal that will require ministerial approval via DPaW wildlife licensing section.

If you have any questions please feel free to ask

Thanks
Andrew Webb

From: Paul van der Moezel [mailto:paul@pgv.net.au]
Sent: Friday, 21 February 2014 4:24 PM
To: Webb, Andrew
Subject: FW: Armstrong Reserve orchid translocation

Andrew

Further to my email to Peter Hanly below and his response are you able to assist in determining a translocation site for the one plant of Caladenia viridescens we would like to translocate from the Armstrong Reserve development site? As mentioned in the email to Peter I think the best location would be elsewhere in the reserve so that firstly it preserves the genetic diversity within the reserve and secondly it doesn't potentially introduce different genetic material into other populations outside of Armstrong Reserve.

Any initial thoughts?

Regards

Paul van der Moezel

Government of **Western Australia**
Department of **Parks and Wildlife**

WILDLIFE CONSERVATION ACT 1950 AS AMENDED - SECTION 23F

PERMIT TO TAKE DECLARED RARE FLORA

The undermentioned person may take declared rare flora for the purpose described, subject to the terms and conditions of this permit. Note: In this permit DRF = Declared Rare Flora.

1. PERMIT NO: 156-1314
2. PERMIT HOLDER: Dr Paul van der Moezel
   ADDRESS: PGV Environmental
   1/62 Guthrie Street
   Osborne Park WA 6017

3. DESCRIPTION OF PLANT

   3.1 SCIENTIFIC NAME: *Caladenia viridescens*.

   3.2 PARTS TO BE TAKEN: Whole plant and soil stored seed.

   3.3 QUANTITY: 1 whole plant and an unknown number of dormant plants and soil stored seed (see conditions 8.1 & 8.2).

4. PURPOSE OF TAKING: Development of aged care facility on Armstrong Reserve (Ministerial Statement 926),

5. METHOD OF TAKING: Mechanical and by hand.

6. AREA TO WHICH PERMIT RELATES: Armstrong Reserve, Naturalist Terrace, Dunsborough; location shown on map provided with application received 25 February 2014).

7. PERIOD FOR WHICH PERMIT IS VALID: From date of signature below to 30 June 2014.

8. CONDITIONS:

8.1 The number of DRF should be limited to that detailed in 3.3 above. If a larger quantity of material is required, a further application shall be made to the Director General, Department of Parks & Wildlife, setting out specific details.

8.2 This permit also covers the taking of the plant subject to this permit as a salvage/translocation into the adjacent Armstrong Reserve, to be undertaken by carefully excavating the plant using a sharp edged square spade and removing, as a block, one spade width and 2/3 of spade depth of soil surrounding the plant, and transplanting it to a suitable location within the existing population in Armstrong Reserve.

8.3 Following translocation, the plant is to be protected from herbivory with a small mesh fence and flagged for ongoing monitoring.

8.4 Hygiene measures are to be undertaken when entering DRF habitat to minimise the risk of introduction or spread of weeds and disease

8.5 The Permittee must notify the local Flora Conservation Officer (Ph. 9752 5555) prior to the works and translocation being undertaken so they can be present to assist at the time of translocation.

8.6 This permit also covers the activities of other persons involved in the activity under the supervision of the permit holder.

8.7 No original DRF material "taken" during the activities shall be used for commercial purposes.

8.8 The location of DRF populations shall be treated as confidential and under no circumstances disclosed to other persons not involved in the project, without the written permission of the Director General, Department of Parks & Wildlife.

Please note: conditions are continued on page 2 of DRF Permit No. 155-1314

MB
.....
(Delegates initials)

Permit conditions continued – DRF Permit No. 155-1314

8.9 The Department reserves the right to remove any other material of this DRF as considered necessary from the site prior to the commencement of works.

8.10 The Permittee shall advise the Flora Administrative Officer, Species & Communities Branch if the taking has been completed within one month of the expiry of this permit.

8.11 Post translocation, monitoring will initially be conducted annually for two years during the flowering time of the species.

8.12 Copies of any report or publication (including monitoring reports), on DRF covered by this permit shall be provided to the Director General, Department of Parks & Wildlife via the Flora Administrative Officer, Species & Communities Branch.

8.13 The permit holder shall produce this permit whenever requested to do so by a Wildlife Officer, or by any person appointed by the body or authority which has the care or control of the land from where the DRF is taken, together with any other approval letters that may be in force during the period of this permit.

Margaret Byrne

DELEGATE OF THE MINISTER FOR ENVIRONMENT
(in accordance with section 133(1) of the CALM Act 1984)

DATE: ....11...../.....5...../2014

12 October 2015

pgv ENVIRONMENTAL

Phone + 61 8 6500 8801
Mob +61 0 427 005 226
Email paul@pgv.net.au

Unit 1, 61 Guthrie Street
Osborne Park WA 6017

ABN 44 981 725 498
Knightside Nominees Pty Ltd

Janine Kuehs

Acting Flora Administrative Officer
Species and Communities Branch
Department of Parks and Wildlife
Locked Bag 104
Bentley Delivery Centre WA 6983

Dear Janine,

RE: DRF Permit No. 156-1314

In accordance with Condition 8.11 of the permit to take Declared Rare Flora (Permit No. 156-1314) I wish to advise you of the 2015 monitoring results of the translocated *Caladenia viridescens* within Armstrong Reserve, Dunsborough.

Translocation of the individual specimen was undertaken on 6 June 2014. The translocation site was inspected on 10 October 2014 last year and again on 6 October 2015 by me. The translocated plant was in full flower on both occasions and in good health (Plate 1).

Plate 1 Translocated Orchid – 6 October 2015

Condition 8.11 of the Permit required the monitoring to be conducted "annually for two years during the flowering time of the species". As the orchid was found to be flowering in both years after translocation I propose that no further monitoring is required at this stage.

Condition 8.3 of the Permit required the plant to be protected from herbivory by a small mesh fence and flagged for ongoing monitoring. The mesh fence was installed immediately after translocation in 2014. Although the two year initial monitoring period has finished I believe it would be beneficial to keep the mesh fence in place not only to protect the plant but to assist any future monitoring should it be required. As a result, the mesh fence has been retained.

Please contact me if you require any further information.

Yours sincerely

Paul van der Moezel
Managing Director

cc. Mark Sheldon-Stemm CEO, Cape Care

APPENDIX 4

LEVEL 2 FAUNA SURVEY
(Source: Ecoscape (Australia) Pty Ltd, 2012a)

Armstrong Reserve Level Two Fauna Survey

Ray Village Aged Services (Inc.) trading as Capecare

science+design

Quality Assurance

Ecoscape (Australia) has implemented a comprehensive range of quality control measures on all aspects of the company's operation and has Quality Assurance certification to ISO 9001.

An internal quality review process has been applied to each project task undertaken by us. Each document is carefully reviewed by senior members of the consultancy team and signed off prior to issue to the client. Draft documents are submitted to the client for comment and acceptance prior to final production.

Limitations Statement

This report has been exclusively drafted for the needs of Ray Village Aged Services (Inc.) trading as Capecare. No express or implied warranties are made by Ecoscape (Australia) Pty Ltd regarding the research findings and data contained in this report. All of the information details included in this report are based upon the existent land area conditions, research provided and obtained, and so forth at the time Ecoscape (Australia) Pty Ltd conducted its analysis into the area. Ecoscape (Australia) Pty Ltd will not be responsible for the application of its recommended strategies by Ray Village Aged Services (Inc.) trading as Capecare

Please note that the strategies devised in this report may not be directly applicable towards another company's needs or any other specific land area requiring management strategies. We would also warn against the environmental dangers of adapting this report's strategies to another land area which has not been researched and analysed by Ecoscape (Australia) Pty Ltd. Instead, please contact Ecoscape (Australia) Pty Ltd to provide a tailored report for your area's needs. Otherwise, Ecoscape (Australia) Pty Ltd accepts no liability whatsoever for a third party's use of, or reliance upon, this specific report.

Direct all inquiries to: **Ecoscape (Australia) Pty Ltd**
9 Stirling Highway • PO Box 50 North Fremantle WA 6159
Ph: (08) 9430 8955 Fax: (08) 9430 8977

Rev No.	Author	Approved for Issue	Date
0	CM	JS	March 2012
1	CM	BV	April 2012
2	CM/JS	BV	May 2012

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Acknowledgements

Ecoscape wishes to acknowledge the City of Busselton for allowing access to Armstrong Reserve for the purpose of conducting the survey.

We thank Paul de Tores for a critical review of the methodology and report.

Summary

Ray Village Aged Services (Inc.) trading as Capecare is a not-for-profit community organisation which delivers aged care services to the south-west region of Western Australia. Capecare has identified Armstrong Reserve, Dunsborough (the study area), as a possible site for the development of an aged care facility. In order to determine the potential impact of the proposed development on the fauna inhabiting the study area, the Office of the Environmental Protection Authority (OEPA) has requested that a Level 2 fauna survey be undertaken on the site.

In addition to the Level 2 survey, a Western Ringtail Possum habitat tree survey of the site east of the drainage reserve was undertaken, in order to meet the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) outcomes involving the replanting or protection of existing habitat.

Ecoscape was commissioned by Capecare to conduct these surveys on site. A Level 2 fauna survey includes an initial background 'desktop' research, followed by a combined reconnaissance and detailed trapping survey. This survey also involved targeted line transect searches for conservation significant fauna, in particular the Western Ringtail Possum (*Pseudocheirus occidentalis*, WRP). A WRP habitat tree survey involves recording locations and diameter at breast height of Peppermint trees (*Agonis flexuosa*) used as habitat by the WRP. The objective of this report is to document the methodology and results of the surveys conducted by Ecoscape and provide recommendations based on the findings.

The desktop assessment identified:

- the study area occurs in the south-west region of Western Australia, which experiences low temperatures and high rainfall throughout the middle of the year
- the study area lies within the Swan Coastal Plain Biogeographical region
- three vegetation types have been identified, through previous surveys, as occurring in the study area
- DEC Threatened and Priority Fauna database search listed 7 threatened species as being found within or near to the study area (5km buffer)
- NatureMap listed 125 terrestrial fauna species as potentially occurring within the study area, including 7 conservation significant fauna species (3km buffer)
- EPBC Protected Matters Search Tool found 23 threatened species which may potentially occur within the study area, excluding listed marine species (3km buffer).

The fauna field survey to verify the findings of the desktop assessment was undertaken in September 2011 and identified:

- a total of 31 species were recorded within the study area through sightings, captures and calls
- the WRP (*Pseudocheirus occiedentalis*) was the only species of conservation significance identified
- a total of 14 WRP dreys and ten WRP sightings
- DISTANCE 4.0 (Thomas et al. 2010) calculated the estimated density of WRP within the 3.51 ha Reserve to be 8.3981 WRP/hectare

The WRP habitat tree survey was conducted in February 2012 and identified:

- 88 trees with a DBH between 10 – 50mm
- 205 trees with a DBH between 51 – 1000mm
- 3 trees with a DBH greater than 1001mm
- 1155.09 m^2 of *P. occidentalis* habitat will be impacted by the proposed development (67.5% of development footprint)

1.0 Introduction

1.1 Project Overview

Ray Village Aged Services (Inc.) trading as Capecare (the proponent) is proposing to develop an aged care facility on a portion of the area known as Armstrong Reserve, Dunsborough, some of which is vested in the City of Busselton.

Ecoscape was commissioned by the proponent to undertake a Level 2 Fauna Survey to identify the fauna values of Lots 111, 115, 116, 117, 257 and 258 (the study area). This will encompass all listed and priority fauna species within the various fauna assemblages (reptiles, birds, amphibians, mammals). The request has arisen from Office of the Environment Protection Authority (OEPA) comments on the Environmental Scoping Document prepared for the proposal.

Ecoscape was also commissioned by the proponent to undertake a Western Ringtail Possum (*Pseudocheirus occidentalis*, WRP) habitat tree survey, required in order to meet the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) outcomes involving the replanting or protection of existing habitat.

1.1.1 STUDY AREA LOCATION

The study area, known colloquially as Armstrong Reserve, is located in the coastal town of Dunsborough, approximately 260 km south of the Perth Metropolitan Area (Figure 1). It is bordered to the north by residential housing, Gifford Road to the east, Armstrong Place to the south and Naturaliste Terrace to the west.

The study area comprises a 'C' class reserve vested in the City of Busselton for the purposes of recreation (i.e. Lot 257 comprising approximately 3.51 ha), and adjacent lots gazetted for use as Shire Depot (0.19 ha), CWA hall and restrooms (0.98 ha), SES Depot (0.1 ha) and drainage reserve (0.21 ha) through the centre, totalling approximately 4.12 ha. The location of the study area in relation to Dunsborough and Perth is represented in **Figure 1**.

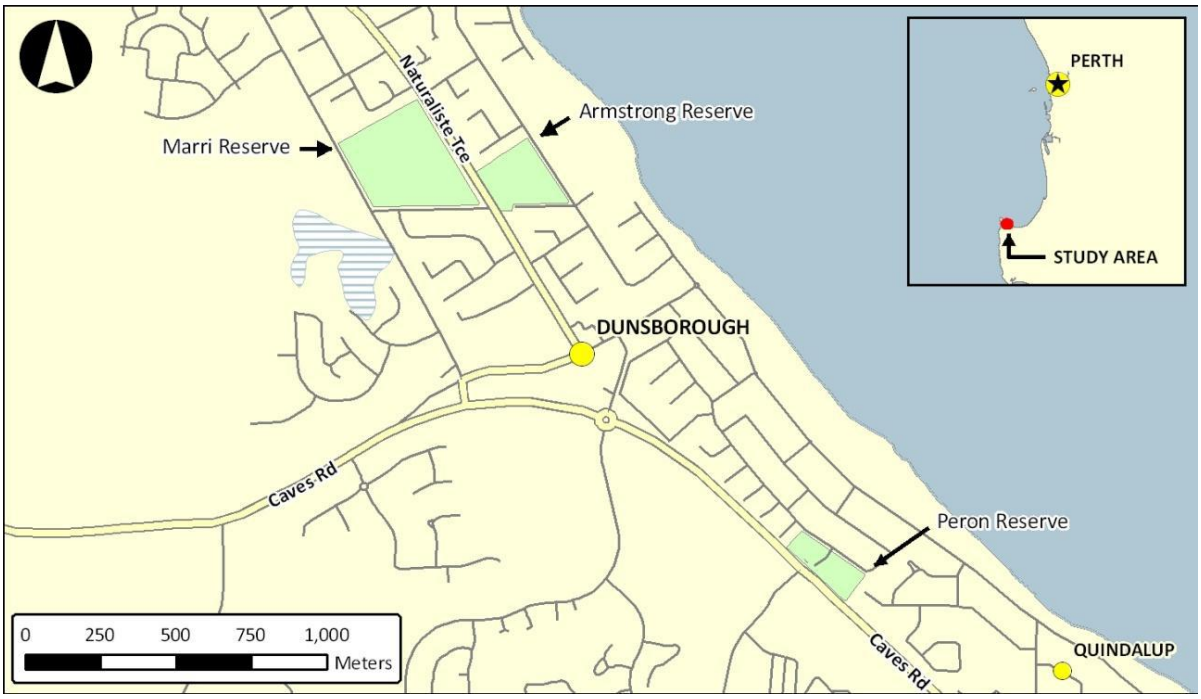

Figure 1. Location of Study Area

2.0 Existing Environment

2.1 Physical Environment

2.1.1 CLIMATE

The south-west of Western Australia experiences a Mediterranean climate of mild, wet winters and warm to hot, dry summers. The climate of the region is strongly influenced by the position of a band of high pressure known as the sub-tropical ridge. For much of the year the ridge is located to the south allowing the east or south easterly winds to prevail. During the cooler months the ridge periodically moves to the north allowing cold fronts to pass over the west coast and deliver much of the annual rainfall (Bureau of Meteorology 2012).

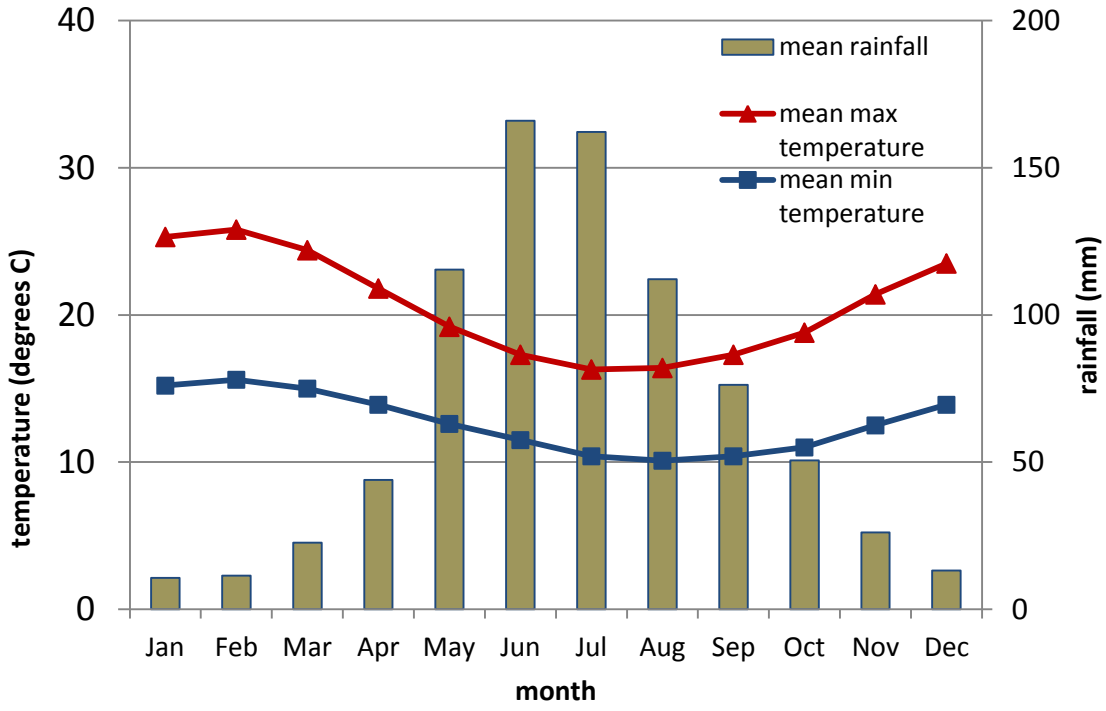

Figure 2. Mean monthly rainfall, and daily maxima and minima for Cape Naturaliste BoM site (1904-2011)

Weather conditions during fieldwork in Dunsborough (12-16/9/11) were reasonably warm, with variable and gusty winds, intermittent sunshine with light to heavy showers on several days. These conditions are reflected in Bureau of Meteorology (BoM) records from the Cape Naturaliste station, listed in **Table 1** below.

Table 1. BoM records from the Cape Naturaliste Station

Date	Minimum temperature	Maximum temperature	Rainfall
11/9	9.4	20.8	0
12/9	12.7	21.9	0
13/9	12.0	17.4	0
14/9	11.3	19.5	0.4
15/9	13.9	19.0	11.6
16/9	14.1	19.9	2.2
17/9	12.6	19.2	8.6

2.1.2 GEOLOGY, TOPOGRAPHY AND SOIL

The study area lies just east of the Dunsborough fault, on the Cenozoic sands of the Perth basin. There is little relief across the study area, mainly a slight slope downward to the north-east.

2.1.3 DRAINAGE

Drainage in the study area is to the north-east. A creek enters the study area from Marri Reserve via a culvert under Naturaliste Terrace, and leaves via a culvert under Gifford Road; it has relatively straight and steep banks which have been modified to assist with stormwater management.

2.1.4 ENVIRONMENTALLY SENSITIVE AREAS

There are a number of areas around Western Australia of environmental significance within which the exemptions to the Native Clearing Regulations do not apply. These are referred to as Environmentally Sensitive Areas (ESAs), and are declared under section 51B of the *Environmental Protection Act* (1986) and described in the *Environmental Protection (Environmentally Sensitive Areas) Notice* (Government of Western Australia 2005).

According to the ESA mapping for the state, viewable on the Government of Western Australia's online *WA Atlas* (2011), the study area does not fall within an ESA. However, an ESA is located approximately 200 metres to the north of the site.

2.2 Biological Environment

2.2.1 BIOGEOGRAPHIC REGION

The study area is located within the Swan Coastal Plain biogeographic region as defined in the Interim Biogeographical Regionalisation for Australia (IBRA) (DSEWPC 2009). Biogeographic regions are delineated on the basis of similar climate, geology, landforms, vegetation and fauna. The Swan Coastal Plain biogeographic region is described as:

Low lying coastal plain, mainly covered with woodlands. It is dominated by *Banksia* or Tuart on sandy soils, *Allocasuarina obesa* on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland. Warm Mediterranean.

Three phases of marine sand dune development provide relief. The outwash plains, once dominated by *A. obesa*-Marri woodlands and *Melaleuca* shrublands, are extensive only in the south.

2.3 Vegetation

2.3.1 VEGETATION TYPES

Armstrong Reserve occurs within an area mapped as the Abba Vegetation Complex (Mattiske & Havel 1998). Ecoscape has previously conducted a Level 2 flora and vegetation assessment survey on Armstrong Reserve (Ecoscape 2010). This survey identified three vegetation types, correlating with landscape position. The vegetation types occurring within the Reserve are outlined in **Table 2**.

Table 2. Vegetation Types of Armstrong Reserve

Vegetation Type	Landscape Position
Melaleuca rhaphiophylla, Eucalyptus rudis, Agonis flexuosa Low Open Forest or Woodland over *Viminaria juncea, Hakea varia* Tall Open Shrubland, over *Xanthorrhoea preissii* Low Open Shrubland to Low Open Heath over *Lepidosperma squamatum, Cyathochaeta avenacea, Tetraria capillaris* and mixed species Sedgeland.	Dampland
Agonis flexuosa and *Corymbia calophylla* with mixed species Low Open Forest to Open woodland over *Hakea varia, Jacksonia furcellata* and *Viminaria juncea* Tall Open Shrubland over Mixed Open Shrubland over *Hibbertia hypericoides and Xanthorrhoea* spp. Low Open Shrubland over *Mesomelaena tetragona* and mixed species Sedgeland over *Caesia micrantha* and *Conostylis aculeata* Very Open Herbland.	Mid-slope
Corymbia calophylla, Agonis flexuosa, Eucalyptus rudis and *Banksia littoralis* Open Forest to Low Woodland occasionally over *Jacksonia furcellata* Tall Open Shrubland occasionally over *Acacia divergens, Acacia pulchella* and *Daviesia divaricata* Open Heath over *Xanthorrhoea preissii, Hibbertia hypericoides* and mixed species Open Low Heath to Low Shrubland over mixed Open Herbland and mixed Open to Very Open Sedgeland.	Upland

3.0 Methods

3.1 Level 2 Fauna Field Survey

The fauna assessment methodology used was developed to comply with Ecoscape's interpretation of the requirements of a Level 2 survey based upon the EPA's *Guidance for the Assessment of Environmental Factors No 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western* Australia (2004) and *Technical Guide – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (2010).

The fauna assessment comprised of a detailed trapping survey of the study area combined with targeted spotlight searches for Western Ringtail Possum.

Techniques used in the survey included:

- Trapping using funnel traps and Elliott traps
- Spotlighting along line transects, targeting Western Ringtail Possum
- Bird census using both visual and auditory techniques
- Leaf litter raking and fallen log hand searching
- Identification of scats, bones, tracks, diggings and burrows and the analysis of predator scats

Trapping

Fifteen funnel traps (Terrestrial Ecosystems, Perth, WA; Thompson & Thompson 2007) and 15 Elliott traps (Elliott Scientific Equipment, Upwey, VIC) were distributed throughout the study area (**Table 3**). Drift fences were placed on both ends of the funnel traps and Elliott traps were provided with bait. Bait was replaced when required. Bait used was universal type as specified in the DSEWPC guidelines. Traps were placed in protected areas to provide shade, and at least 3 m from obvious pedestrian paths to limit disturbance. Traps remained in place for four nights and were checked each morning. One Elliott trap was left closed for the last night due to presence of a large number of ants.

Table 3. Summary of trapping effort for the survey

	Type of trap	
	Funnel	**Elliott**
Number of traps	15	15 (14 final night)
Number of nights	4	4
Total trap nights	60	59

Wire cage traps were not used, as the species that would be targeted by this style of trap (medium-sized mammals such as possums, cats, rabbits) could be adequately detected by other means.

Opportunistic Observations

Opportunistic observations were made during the day whilst walking the study area. Searches were conducted by two personnel during the survey period. Searches were focussed on areas where species were likely to be present, such as under leaf litter or fallen logs. Photography was used to record observations, allowing subsequent identification of animals not determinable in the field.

Bird Census

Bird censuses were undertaken each day. For each census the observer walked through the study area and around the perimeter, recording the number of bird species and number of individuals of each species, based on sightings and calls. Birds observed or heard, while walking around the site or checking traps were also recorded in a species list.

Western Ringtail Possum Line Transects

Ecoscape adopted a line transect methodology, previously used by de Tores and Elscot (2010), to estimate the density of Western Ringtail Possums on Armstrong Reserve. This method required nocturnal spotlighting along transects, recording the perpendicular distance from the transect line to each sighting.

A total of five transect lines were surveyed over four consecutive nights, by a team of two zoologists, experienced in spotlight surveys. The most westerly transect line began at the edge of bushland adjacent to a cleared area (carpark) and followed an easting rounded to the nearest 10 m, to facilitate navigation by GPS; its location was not determined with reference to possum sightings, dreys or habitat trees, so is considered effectively random for the purposes of experimental design. Transects ran north to south and were spaced 50 m apart, but varied in length (

Map 1). On sighting a possum, the person holding the spotlight remained in position to maintain visual contact, while the other recorded the horizontal distance and compass angle to the animal; these data were subsequently converted to perpendicular distance using the sine of the angle.

The program DISTANCE was used to analyse the data and provide estimates of density of Western Ringtail Possum in the study area. Density estimates were derived using DISTANCE Sampling protocols (Buckland et al. 2001) and the Line Transect option of the software DISTANCE 4.0 (Thomas et al. 2010).

3.2 Western Ringtail Possum Habitat Tree Survey

Field Survey

A Western Ringtail Possum habitat tree survey was conducted on the portion of the study area to the east of the drainage line in order to identify the number of trees and quantity of habitat suitable for the Western Ringtail Possum. The location of peppermint trees (*Agonis flexuosa*) was recorded using a DGPS (0.5 – 1m accuracy) and diameter at breast height (DBH) was measured using a DBH tape measure and recorded.

Whilst surveying the study area, the proportion of suitable habitat for Western Ringtail Possums was also assessed in order to accurately calculate the area of habitat likely to be impacted by the development.

Calculating Offsets

Advice supplied by DSEWPC lists outcomes regarding the replanting and protection of existing Western Ringtail Possum habitat, understorey and Peppermint trees (DSEWPC 2010).

Offset ratios include:

- 1:1 for all understorey removed
- 1:1 for any Peppermint trees cleared that are between 10mm and 50mm diameter at breast height
- 5:1 for any Peppermint trees cleared that are between 51mm and 1000mm diameter at breast height
- 10:1 for any Peppermint trees cleared that are greater that 1001mm diameter at breast height
- Protection and replanting of any Western Ringtail Possum habitat which is impacted.

3.3 Survey Limitations

The EPA Guidance for Assessment of Environmental Factors: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia, No. 56 (EPA 2004) suggested that fauna

surveys may be limited by many variables. Limitations associated with each of these variables are assessed in **Table 4**.

Table 4. Statement of Limitations

Possible Limitations	Constraints (Yes/No): Significant, Moderate or Negligible	Comment
Competency/experience of the consultant conducting the survey	No Constraint	All field survey staff had relevant recent experience with the survey techniques used. Senior staff have extensive experience with species identification over all fauna assemblages
Scope	No Constraint	Scope was not constrained; access to all habitat types was unconstrained.
Proportion of fauna identified, recorded and/or collected	No Constraint	All observed and captured species identified. No vertebrate species collected, all vertebrate fauna observed identified.
Proportion of the task achieved and further work that may need to be undertaken	No Constraint	All aspects of the task were achieved
Timing/weather/season/cycle	Yes, Moderate	Weather conditions during survey period could be considered less suitable for some reptile species.
Intensity of survey (e.g. In retrospect was the intensity adequate?)	No Constraint	The number of traps used was adequate for the area being surveyed and these were distributed throughout the Reserve. However, only four species were caught in traps. This was thought to be due to the weather and season, rather than the intensity of the survey.
Disturbances which affected results of the survey	Yes, Negligible	Reserve often used by people with dogs during the survey, could have affected success of trapping.
Sources of information	No Constraint	A previous survey of Armstrong Reserve was conducted in 2007 by ATA Environmental, which targeted Western Ringtail Possums. Additional surveys for WRP have been conducted in the Busselton/Dunsborough area.
Completeness (e.g. Was relevant area fully surveyed?)	No Constraint	Area fully covered.
Resources (e.g. Degree of expertise available for fauna identification)	No Constraint	Adequate resources were available
Remoteness and/or access problems	No Constraint	No access restrictions.
Availability of contextual (e.g. bioregional) information for the survey area	No Constraint	Department of Environment and Conservation's Threatened and Priority species database and published and unpublished reports of surveys conducted in the region were available.

4.0 Results

4.1 Level 2 Fauna Survey

4.1.1 DESKTOP ASSESSMENT

The Bush Forever list, DEC Threatened and Prioirity Fauna database, NatureMap and the Protected Matters Search Tool were all consulted in order to put together lists of species expected to occur in the area. Seven conservation significant fauna species were identified through the DEC database search for the study area, excluding listed marine species (**Table 5**). A search of *NatureMap* identified 125 terrestrial species (**Appendix One**), including the same seven conservation significant fauna species, which are considered as potentially occurring in the study area.

The EPBC *Protected Matters Search Tool* (**Appendix Two, Table 6**) identified 23 threatened species potentially occurring in the vicinity of the study area (Australian Government 2010), but many were marine.

Tables 5 and **6** show species that may utilise terrestrial habitats. The remainder were migratory marine birds, fly-over species, fish, marine species or Cetaceans and therefore are not considered of importance to the study area.

4.1.1.1 Threatened and Priority Fauna (State Legislation)

Table 5: DEC Threatened and Priority Fauna Search Results (5km buffer)

Scientific Name	Common Name	EPBC Act	WC Act	State/DEC Listing
Calyptorhynchus baudinii	Baudin's Black Cockatoo	Vulnerable	Schedule 1	T
Pseudocheirus occidentalis	Western Ringtail Possum	Vulnerable	Schedule 1	T
Falco peregrinus	Peregrine Falcon		Schedule 4	S
Isoodon obesulus subsp. *fusciventer*	Southern Brown Bandicoot			P5
Macropus irma	Western Brush Wallaby			P4

4.1.1.2 Environmental Protection and Biodiversity Conservation Act 1999 (Federal Legislation)

Table 6: Protected Matters Search Tool Results

Scientific Name	Common Name	EPBC Status	Type of Presence
THREATENED SPECIES - TERRESTRIAL			
Mammals			
Dasyurus geoffroii	Western Quoll	Vulnerable	Likely to occur
Pseudocheirus occidentalis	Western Ringtail Possum	Vulnerable	Likely to occur
Birds			

Scientific Name	Common Name	EPBC Status	Type of Presence
Botaurus poiciloptilus	Australasian Bittern	Endangered	May occur
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo	Vulnerable	May occur
Calyptorhynchus baudinii	Baudin's Black Cockatoo	Vulnerable	Breeding known to occur
Calyptorhynchus latirostris	Carnaby's Black Cockatoo	Endangered	Likely to occur
MIGRATORY SPECIES			
Migratory Marine Birds			
Apus pacificus	Fork-tailed Swift	Migratory	May occur
Ardea alba	Great Egret	Migratory	May occur
Ardea ibis	Cattle Egret	Migratory	May occur
Migratory Terrestrial Species			
Haliaeetus leucogaster	White-bellied Sea Eagle	Migratory	Likely to occur
Merops ornatus	Rainbow Bee-eater	Migratory	May occur
Migratory Wetland Species			
Ardea alba	Great Egret	Migratory	May occur
Ardea ibis	Cattle Egret	Migratory	May occur

4.1.2 FIELD SURVEY

4.1.2.1 Trap Captures

A total of four different species were recorded through trap captures, two amphibians and two reptiles (**Table 7**). The number of individuals of each species caught in a single trap ranged from 1 to 4 individuals. All individuals were caught in funnel traps, with no captures in Elliott traps.

Table 7. Summary of Trap Captures

Date	Trap Number	Trap Type	Species Name	Common Name	Number of individuals in trap
13/9/2011	3	Funnel	*Heleioporus eyrei*	Moaning Frog	1
13/9/2011	12	Funnel	*Heleioporus eyrei*	Moaning Frog	1
14/9/2011	14	Funnel	*Morethia lineoocellata*	Pale-flecked Morethia	1
15/9/2011	1	Funnel	*Heleioporus eyrei*	Moaning Frog	1
15/9/2011	2	Funnel	*Heleioporus eyrei*	Moaning Frog	1
15/9/2011	1	Funnel	*Morethia lineoocellata*	Pale-flecked Morethia	4
15/9/2011	7	Funnel	*Morethia lineoocellata*	Pale-flecked Morethia	1
15/9/2011	15	Funnel	*Morethia lineoocellata*	Pale-flecked Morethia	1
16/9/2011	13	Funnel	*Limnodynastes dorsalis*	Banjo Frog	1
16/9/2011	15	Funnel	*Ctenotus labillardieri*	Red-legged Ctenotus	1

4.1.2.2 Bird Census

Sixteen species of birds were identified by sight or call during three sessions of bird census over three days, the number of individuals ranging from one to six (**Table 8**). Red Wattlebirds, Magpies, Ravens and Grey Butcherbirds were frequently recorded in relatively high numbers at the site.

Table 8. Bird Census Results

Date	Time	Species Name	Common Name	Number Observed/Heard
13/9/2011	10:40 – 11:00	*Cracticus torquatus*	Grey Butcherbird	1
		Anthochaera arunculata	Red Wattlebird	4
		Phaps chalcoptera	Bronzewing Pigeon	1
		Cracticus tibicen	Magpie	3
		Corvus coronoides	Raven	1
		Hirundo neoxena	Welcome Swallow	3
		Anas superciliosus	Pacific Black Duck	2
14/9/2011	10:40 – 11:00	*Anthochaera carunculata*	Red Wattlebird	2
		Cracticus tibicen	Magpie	5
		Corvus coronoides	Raven	1
		Malurus splendens	Splendid Fairy Wren	2
		Lichenostomus virescens	Singing Honeyeater	3
		Cacatua sp. indet.	Corella sp. indet	Present
		Rhipidura leucophrys	Willy Wagtail	1
15/9/2011	5:45 – 6:15	*Barnardius zonarius*	Ringneck Parrot	1
		Cracticus torquatus	Grey Butcherbird	6
		Anthochaera carunculata	Red Wattlebird	Numerous
		Phaps chalcoptera	Bronzewing Pigeon	3
		Cracticus tibicen	Magpie	6
		Corvus coronoides	Raven	5
		Anas superciliosus	Pacific Black Duck	1
		Malurus splendens	Splendid Fairy Wren	5
		Lichenostomus virescens	Singing Honeyeater	1
		Dacelo gigas	Laughing Kookaburra	1
		Cacatua sp. indet.	Corella sp. indet	Present
		Rhipidura leucophrys	Willy Wagtail	1
		Zosterops lateralis	Silvereye	Present
		Gallus gallus	Domestic Chicken	1

4.1.2.3 Opportunistic Observations

Additional species were recorded opportunistically at other times in the study area, and also in the wider area to assess the local fauna that may be expected to occur in the study area. Four additional bird species were recorded in the Reserve, bringing the total bird species found in the survey to 20. Three species of amphibian were identified by calls, bringing the total for amphibians to five. One additional reptile species was observed, bringing the total reptiles recorded during the survey to three. Two invertebrate species were also observed.

Table 9. Opportunistic observations of species over four days, excluding those recorded through trap captures, bird census and transects

Species Name	Common Name	Armstrong Reserve
Myrmecia sp.	Bull ant	Nest
Apis mellifera	Honey Bee	Swarm
Hemiergis peronii tridactyla	Three-toed Skink	4
Haliastur sphenurus	Whistling Kite	3
Stagonopleura oculata	Red-eared Firetail	Calls (outside reserve)
Crinia glauerti	Clicking Frog	Calls
Crinia georgiana	Quacking Frog	Calls
Myobatrachus gouldii	Turtle Frog	Calls
Eolophus roseicapillus	Galah	Flyover

4.1.2.4 Western Ringtail Possum Survey

A total of 14 dreys typical of WRP were observed during the survey. Dreys were most commonly observed in Melaleuca (paperbarks), followed by peppermint trees and Casuarina. In two instances, two dreys were observed directly next to each other in the tree.

One possum was seen in an open drey ('Category 4' of ATA 2007) during the day (**Appendix Two**, **Plate 4**). A total of nine WRPs were observed while spotlighting along line transects (**Table 10** and

Map 1). Pairs of WRP were observed together at two of the observation points during the line transect survey.

Table 10. **Western Ringtail Possum sightings and distance to sightings along line transects.**

Line Transect Number	Line Transect Length (m)	Perpendicular Distance to sighting from line (m)	Number of WRP's observed at point on line
1	100	2.57	1
2	100	5.13	1
2	100	6.43	2
3	100	8.66	2
3	100	1.0	1
4	150	0.68	1
5	75	3.46	1

These data were analysed with DISTANCE 4.0 (Thomas et al. 2010), using the factors of transect length, perpendicular distance to sighting from line, and number of individuals observed at that point on the line. The Effective Strip Width was estimated to be 7.94 m, within which there was a 91.6% probability of observing a Western Ringtail Possum. Density of WRPs was estimated to be 8.398 WRPs per hectare, with 95% confidence interval 3.430 to 20.559. The central estimate for number of WRPs in the 3.51 ha Reserve at the time of the survey is thus 29.5, with 95% probability that the population is in the range 12.0 to 72.2.

4.2 Western Ringtail Possum Habitat Tree Survey

A total of 294 Peppermint trees were recorded east of the drainage line, of which 174 occur within the development footprint (**Map 2**). Of the 174 Peppermint trees occurring within the development footprint, the numbers of trees within each DBH size class and the subsequent number of trees to offset are summarised in **Table 11.** Raw data is provided in **Appendix 3**.

Table 11. **Number of trees recorded within each DBH category and number to offset**

DBH Size Category	Number of trees	Offset ratio	Number to offset
10 – 50mm	45	1:1	45
51 – 1000mm	127	5:1	635
>1001mm	2	10:1	20
Total	174		700

Table 12 below outlines the area and proportion of development footprint containing understorey, Priority Ecological Community and Western Ringtail Possum habitat**.** These are also displayed in **Map 2.**

Table 12. Area and proportion of development footprint containing understory, Priority Ecological Community and Western Ringtail Possum habitat

Area of understorey impacted by development (square metres)	9020
Proportion of development footprint containing understorey (%)	77
Area of PEC impacted by development (square metres)	4352
Proportion of development footprint containing PEC (%)	13.16
Area of WRP habitat impacted by development (square metres)	9020
Proportion of development footprint containing WRP habitat (%)	77

4.3 Assessing Regional and Local Significance of Species

Fauna species may be described as regionally conservation significant if they are listed under the EPBC Act, WC Act, or Bush Forever list of threatened species. A species may be of local significance to a site if there are known records from within 10 km of the site. These records may come from the DEC database, NatureMap, Protected Matters Search Tool or from other surveys conducted on or near the site.

Based on these criteria, the study area would be of local conservation significance for the following species:

- **Baudin's Black Cockatoo** *Calyptorhynchus baudinii*
- **Forest Red-tailed Black Cockatoo** *Calyptorhynchus banksii naso*
- **Carnaby's Black Cockatoo** *Calyptorhynchus latirostris*
- **Australasian Bittern** *Botaurus poiciloptilus*
- **Peregrine Falcon** *Falco peregrinus*
- **Western Ringtail Possum** *Pseudocheirus occidentalis*
- **Southern Brown Bandicoot** *Isoodon obesulus fusciventer*
- **Western Brush Wallaby** *Macropus irma*
- **Western Quoll** *Dasyurus geoffroii*

5.0 Discussion

The Level 2 fauna assessment identified a range of fauna species which inhabit Armstrong Reserve, through trapping, bird census and opportunistic observations. Of these, the Western Ringtail Possum (*Pseudocheirus occiedentalis*) was the only species of conservation significance.

A total of 14 Western Ringtail Possum dreys were observed during the survey (3.99 per ha) and nine WRP's were directly observed during line transect searches. Based on analysis of the line transect data the population of Western Ringtail Possums inhabiting the Reserve was estimated as 29.5 (density 8.4 per ha), but with rather broad confidence intervals (12.0 – 72.2) due to the low number of independent sightings. The density estimate does not differ significantly from those obtained using similar methodology, but more intensive surveys, at sites to the east of Dunsborough (de Tores & Elscot 2010).

The number of dreys recorded in Armstrong Reserve (14) is the same as reported by ATA Environmental (2007) in a targeted survey conducted in March 2007. ATA (2007) estimated the density of WRPs in the Reserve as 6 per ha (based on number directly observed rather than a line transect protocol), but considered this to be a possible underestimate. This is also considered likely here, based on the discussion of de Tores and Elscot (2010), but the ATA estimate does not differ significantly from that obtained in this study. Thus, no trend of population increase or decrease can be inferred over recent years.

Observations made during the field survey suggest that the entire reserve would provide suitable nesting and foraging habitat for the Western Ringtail Possum. Further, DEC recorded a nominated Priority 1 Priority Ecological Community (PEC) ('*Corymbia calophylla, Melaleuca rhaphiophylla, Banksia littoralis, Eucalyptus rudis, Agonis flexuosa* low open forest with seasonal subsoil moisture of the Dunsborough area') on Armstrong Reserve. A total of 2060.58 square metres of the PEC will be impacted by the development footprint.

Phytophthora cinnamomi dieback is known to be present on the reserve, either spread passively from earlier infestation in Marri Reserve (Ecoscape 2010) or with soil and garden waste introduced from nearby properties. However, many characteristic species of the reserve are dieback resistant, including *Agonis flexuosa* (Peppermint tree), *Corymbia calophylla, Eucalyptus rudis, Melaleuca preissiana and Viminaria juncea* (Groves et al. 2009). These species will remain healthy despite the dieback infestation and consequently habitat of the Western Ringtail Possum will not be impacted by the disease.

Clearing of part of the reserve for the proposed development will negatively impact the Western Ringtail Possum through a reduction in foraging and nesting habitat. Observations made during the survey suggest that the Western Ringtail Possum population on Armstrong Reserve is already at or

near capacity. This was indicated by Western Ringtail Possum observed using half-made dreys and on two occasions, two dreys found next to each other in the same tree.

According to the *Significant impact guidelines for the vulnerable western ringtail possum* (DEWHA 2008), Armstrong Reserve occurs within an area of core Western Ringtail Possum habitat on the southern Swan Coastal Plain. As such, there is the potential for a significant impact to the species if the action results in one or more of the following:

- Clearing in a remnant habitat patch which is greater than 0.5 ha in size
- Clearing of more than 50% of a remnant habitat patch which is between 0.1 and 0.5 ha in size, or;
- Fragmentation of existing habitat linkages

According to the first of these criteria the proposed development would have a significant impact on WRP's as Armstrong Reserve is approximately 4 ha in size. However, following DSEWPC advice, measures will be taken by Capecare in order to mitigate impact to WRP's (DSEWPC 2010). These will include the replanting of 725 peppermint trees on site or nearby to offset the 174 Peppermint trees being removed, the replanting and protection of understorey, and replanting and protection of WRP habitat.

The proposed development does not require the clearing of more than 50% of Armstrong Reserve and the Reserve is greater than 0.5 hectares.

The proposed development design does not fragment existing habitat linkages. The design of the proposed development (**Map 2**) maintains a linkage for WRPs to move between Armstrong Reserve and Marri Reserve, adjacent to the west. This may assist in minimising the impact to WRPs and other fauna of the site.

In addition to these planned measures, Ecoscape also recommends that:

- Where practicable, logs and fallen debris resulting from clearing activities should be used to enhance fauna habitat in retained or rehabilitated areas
- Protection of Western Ringtail Possums and other fauna during construction works is ensured
- Long term protection of remaining Western Ringtail Possums habitat on Armstrong Reserve in ensured.

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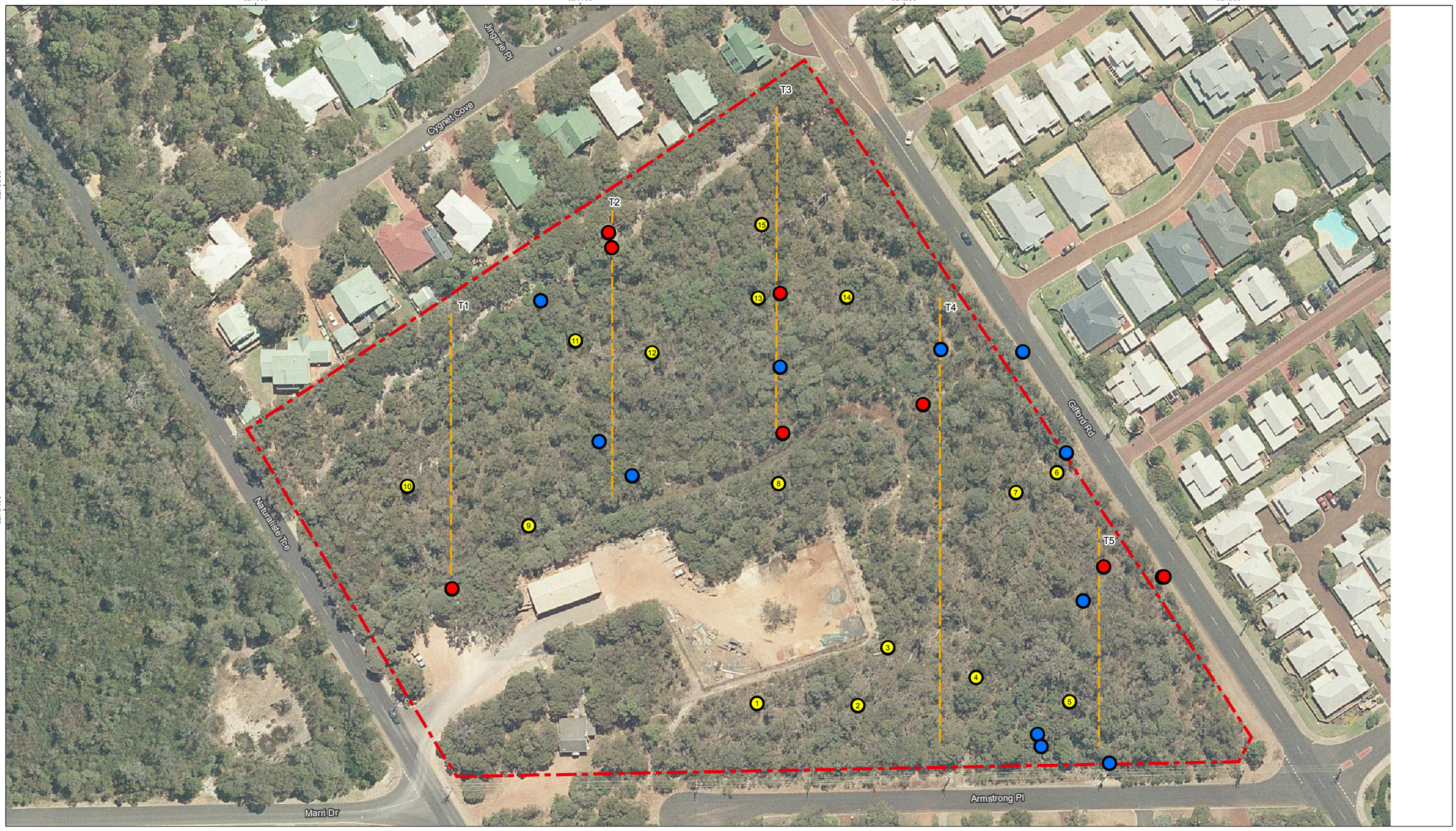
Maps



GDA 1994 MGA Zone 50

0 25 50 m

Scale 1:1,115 @ A3

Legend

- Study Area
- Dreys
- WRP Sighting
- Trap Location (Funnel and Elliot)
- Line Transects

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Map Author: CM
Approved: SB
Revision: 0
Project No: 2582-10

Armstrong Reserve Level 2 Fauna Survey
Cape Care Ray Village Aged Services Inc.

MAP 1

Western Ringtail Possum Line Transect Survey

323950 324000 324050 324100 324150 324200 324250 324300 324350

6279550 6279500 6279450 6279400 6279350 6279300

Legend

- Armstrong Reserve Study Area
- Retirement Village Development Footprint
- Western Ringtail Possum Habitat Trees
- WRP Habitat Trees Impacted By Development
- PEC Boundary (DEC)
- PEC Boundary (DEC) Impacted by Development

GDA 1994 MGA Zone 50

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AUTHOR: CM CHECKED: BV
DATE: 04-12 PROJECT NO: 2582-10
SCALE: 1:1,040 @ A3

0 20 40 60 m

ARMSTRONG RESERVE FAUNA SURVEY

RAY VILLAGE AGED SERVICES INC.

WRP HABITAT TREE LOCATIONS, PEC BOUNDARY AND DEVELOPMENT FOOTPRINT

MAP 2

Appendix One: Fauna Species List

List of species known or expected to occur in and around Dunsborough, based on PMST, NatureMap, other sources, and this survey. 'Other in area' indicates nearest opportunistic observations outside Armstrong Reserve during the period of the survey: Duns., Dunsborough; D-B, between Dunsborough and Busselton.

Family	Species Name	Common Name	Habitat	Cons. Code	Armstrong Res.	Other in area
AMPHIBIANS						
Hylidae	*Litoria adelaidensis*	Slender Tree Frog	swamp			
Myobatrachidae	*Crinia georgiana*	Red-thighed Froglet	swamp		calls	
	Crinia glauerti	Clicking Frog(let)	swamp		calls	
	Crinia pseudinsignifera	Bleating Froglet	swamp			
	Metacrinia nichollsi	Forest Toadlet	swamp			
	Pseudophryne guentheri	Crawling Toadlet	logs etc.			
	Myobatrachus gouldii	Turtle Frog	sand		calls	
Limnodynastidae	*Heleioporus eyrei*	Moaning Frog	swamp		4	
	Heleioporus inornatus	Whooping Frog	acid bog			
	Limnodynastes dorsalis	Western Banjo Frog	swamp		2	
MAMMALS						
Peramelidae	*Isoodon obesulus fusciventer*	Southern Brown Bandicoot, Quenda		P5		
Dasyuridae	*Dasyurus geoffroii*	Western Quoll, Chuditch		T – VU		
	Phascogale tapoatafa	Southern Brush-tailed Phascogale,Wambenger		(T)		
	Sminthopsis griseoventer	Grey-bellied Dunnart				
Tarsipedidae	*Tarsipes rostratus*	Honey Possum	heath			
Pseudocheiridae	*Pseudocheirus occidentalis*	Western Ringtail Poss		T - VU	14 dreys, 9 sightings	D-B
Burramyidae	*Cercartetus concinnus*	Western Pygmy-possum, Mundarda	heath			
Phalangeridae	*Trichosurus vulpecula*	Common Brushtail Poss				
Macropodidae	*Macropus fuliginosus*	Western Grey Kangaroo				
	Macropus irma	Western Brush Wallaby		P4		
	Setonix brachyurus	Quokka		T - VU		
Vespertilionidae	*Chalinolobus gouldii*	Gould's Wattled Bat				
	Nyctophilus geoffroii	Lesser Long-eared Bat				
	Nyctophilus timoriensis major	Greater Long-eared Bat				
	Vespadelus regulus	Southern Forest Bat				
Muridae	*Mus musculus*	House Mouse		Y		
	Rattus fuscipes	Western Bush Rat				
	Rattus rattus	Black Rat		Y		
Leporidae	*Oryctolagus cuniculus*	Rabbit		Y	diggings	1
Canidae	*Canis lupus familiaris*	Dog		Y	2	
	Vulpes vulpes	Fox		Y		
Felidae	*Felis catus*	Cat		Y	traces	
REPTILES						
Chelidae	*Chelodina oblonga*	Oblong Turtle	freshwater			

Family	Species Name	Common Name	Habitat	Cons. Code	Armstrong Res.	Other in area
Agamidae	*Pogona m. minor*	Western Bearded Dragon			heard?	
Gekkonidae	*Christinus marmoratus*	Marbled Gecko	limestone			
Pygopodidae	*Aprasia pulchella*	Western Granite Worm-lizard				
	Aprasia repens	SW Sandplain Worm-lizard				
	Lialis burtonis	Burton's Snake-lizard				
	Pygopus lepidopodus	Common Scaly-foot				
Scincidae	*Acritoscincus trilineatum*	South-western Cool Skink				
	Cryptoblepharus buchananii	Fence skink				
	Ctenotus delli	Darling Range Heath Ctenotus		P4		
	Ctenotus labillardieri	Red-legged Ctenotus			1	
	Egernia napoleonis	S-W Crevice Egernia	rocks/logs			
	Hemiergis peronii tridactyla	Lowland Earless Skink (3:3)			4	
	Lerista distinguenda	SW 4-toed Lerista (4:4)				
	Lerista elegans	West Coast 4-toed Lerista (4:4)				
	Menetia greyii	Common Dwarf Skink				
	Morethia lineoocellata	West-coast Pale-flecked Morethia			7	
	Tiliqua rugosa	Bobtail				D-B
Varanidae	*Varanus rosenbergi*	Heath Monitor				
Typhlopidae	*Ramphotyphlops australis*	Southern Blind Snake				
Pythonidae	*Morelia spilota imbricata*	Carpet Python		S		
Elapidae	*Echiopsis curta*	Bardick				
	Elapognathus coronatus	Crowned Snake				
	Notechis scutatus	Tiger Snake				D-B
	Parasuta gouldii	Gould's Hooded Snake				
	Pseudonaja affinis affinis	Dugite				
BIRDS						
Casuariidae	*Dromaius novaehollandiae*	Emu				
Phasianidae	*Coturnix pectoralis*	Stubble Quail				
	Gallus gallus	Domestic Chicken			calls	
Anatidae	*Anas gracilis*	Grey Teal				
	Anas platyrhynchos	Mallard				
	Anas rhynchotis	Australasian Shoveler				
	Anas superciliosa	Pacific Black Duck			4	D-B
	Aythya australis	Hardhead				
	Biziura lobata	Musk Duck				
	Chenonetta jubata	Australian Wood Duck				Duns.
	Cygnus atratus	Black Swan				
	Malacorhynchus membranaceus	Pink-eared Duck				
	Oxyura australis	Blue-billed Duck				
	Tadorna tadornoides	Australian Shelduck, Mountain Duck				
Phaethontidae	*Phaethon rubricauda*	Red-tailed Tropicbird				
Podicipedidae	*Poliocephalus poliocephalus*	Hoary-headed Grebe				

Family	Species Name	Common Name	Habitat	Cons. Code	Armstrong Res.	Other in area
	Tachybaptus novaehollandiae	Australasian Grebe, Black-throated Grebe				Duns.
Columbidae	*Columba livia*	Domestic Pigeon		Y		D-B
	Ocyphaps lophotes	Crested Pigeon				D-B
	Phaps chalcoptera	Common Bronzewing			4	D-B
	Phaps elegans	Brush Bronzewing				
	Streptopelia senegalensis	Laughing Turtle-Dove		Y		
Podargidae	*Podargus strigoides*	Tawny Frogmouth				
Hydrobatidae	*Oceanites oceanicus*	Wilson's Storm Petrel	Marine			
Diomedeidae	*Thalassarche carteri*	Indian Yellow-nosed Albatross	Marine	VU		
	Thalassarche melanophrys	Black-browed Albatross	Marine	VU		
Procellariidae	*Daption capense*	Cape Petrel	Marine			
	Fulmarus glacialoides	Southern Fulmar	Marine			
Spheniscidae	*Eudyptula minor*	Little Penguin	Marine			
Sulidae	*Morus serrator*	Australasian Gannet				
Anhingidae	*Anhinga novaehollandiae*	Anhinga, Darter				
Phalacrocoracidae	*Microcarbo melanoleucos*	Little Pied Cormorant				D-B
	Phalacrocorax carbo	Great Cormorant				D-B
	Phalacrocorax sulcirostris	Little Black Cormorant				D-B
	Phalacrocorax varius	Pied Cormorant				
Pelecanidae	*Pelecanus conspicillatus*	Australian Pelican				D-B
Ardeidae	*Ardea ibis*	Cattle Egret		M		
	Ardea modesta (=alba)	Great Egret		M		Duns.
	Ardea pacifica	White-necked Heron				
	Egretta novaehollandiae	White-faced heron				Duns.
	Egretta sacra	Reef Heron				
	Nycticorax caledonicus	Rufous Night Heron				
Threskiornithidae	*Platalea flavipes*	Yellow-billed Spoonbill				
	Platalea regia	Royal Spoonbill				
	Threskiornis molucca	Australian White Ibis				D-B
	Threskiornis spinicollis	Straw-necked Ibis				Bunbury
Accipitridae	*Pandion cristatus*	Osprey				
	Elanus axillaris	Black-shouldered Kite				
	Lophoictinia isura	Square-tailed Kite				
	Haliaeetus leucogaster	White-bellied Sea-Eagle				
	Haliastur sphenurus	Whistling Kite			3	
	Accipiter fasciatus	Brown Goshawk				
	Accipiter cirrocephalus	Collared Sparrowhawk				
	Circus approximans	Swamp Harrier				
	Aquila audax	Wedge-tailed Eagle				
	Hieraaetus morphnoides	Little Eagle				
Falconidae	*Falco cenchroides*	Australian Kestrel				
	Falco berigora	Brown Falcon				
	Falco longipennis	Australian Hobby				
	Falco peregrinus	Peregrine Falcon		S		

Family	Species Name	Common Name	Habitat	Cons. Code	Armstrong Res.	Other in area
Rallidae	*Fulica atra*	Eurasian Coot				
	Gallinula tenebrosa	Dusky Moorhen				Duns.
	Porphyrio porphyrio	Purple Swamphen				
	Porzana pusilla palustris	Baillon's Crake				
	Porzana tabuensis	Spotless Crake				
	Tribonyx ventralis	Black-tailed Native Hen				
Haematopodidae	*Haematopus fuliginosus*	Sooty Oyestercatcher				
	Haematopus longirostris	Pied Oystercatcher				
Charadriidae	*Charadrius leschenaultii*	Greater Sand Plover				
	Charadrius mongolus	Lesser Sand Plover				
	Charadrius ruficapillus	Red-capped Plover				
	Elseyornis melanops	Black-fronted Dotterel				
	Thinornis rubricollis	Hooded Plover				
	Vanellus miles	Masked Lapwing				
	Vanellus tricolor	Banded Lapwing				
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper				
	Calidris acuminata	Sharp-tailed Sandpiper				
	Calidris alba	Sanderling				
	Calidris ferruginea	Curlew Sandpiper				
	Calidris ruficollis	Red-necked Stint				
	Limosa limosa	Black-tailed Godwit				
	Tringa glareola	Wood Sandpiper				
	Tringa nebularia	Common Greenshank				
	Tringa stagnatilis	Marsh Sandpiper				
Recurvirostridae	*Cladorhynchus leucocephalus*	Banded Stilt				
	Himantopus himantopus	Black-winged Stilt				
	Recurvirostra novaehollandiae	Red-necked Avocet				
Stercorariidae	*Stercorarius antarcticus*	Antarctic Skua				
Laridae	*Chroicocephalus novaehollandiae*	Silver Gull				
	Hydroprogne caspia	Caspian Tern				
	Larus pacificus	Pacific Gull				D-B
	Onychoprion anaethetus	Bridled Tern				
	Sternula nereis	Fairy Tern				
	Thalasseus bergii	Crested Tern				
Cacatuidae	*Calyptorhynchus banksii naso*	Forest Red-tailed Black-Cockatoo		T – VU		
	Calyptorhynchus sp.	White-tailed Black Cockatoo indet.		T		
	Calyptorhynchus baudinii	Baudin's Black-Cockatoo		T – VU		
	Calyptorhynchus latirostris	Carnaby's Black-Cockatoo		T – EN		
	Eolophus roseicapillus	Galah			1	D-B
	Cacatua sp.	Corella sp. indet.			calls	
	Cacatua pastinator	Western Long-billed Corella		Y		
	Cacatua sanguinea	Little Corella				

Family	Species Name	Common Name	Habitat	Cons. Code	Armstrong Res.	Other in area
Psittacidae	*Glossopsitta porphyrocephala*	Purple-crowned Lorikeet				
	Polytelis anthopeplus	Regent Parrot				
	Platycercus icterotis	Western Rosella				
	Barnardius zonarius	Australian Ringneck			1	D-B
	Purpureicephalus spurius	Red-capped Parrot				D-B
	Neophema elegans	Elegant Parrot				
	Neophema petrophila	Rock Parrot				
Cuculidae	*Cacomantis flabelliformis*	Fan-tailed Cuckoo				
	Cacomantis pallidus	Pallid Cuckoo				
	Chalcites basalis	Horsfield's Bronze Cuckoo				
	Chalcites lucidus	Shining Bronze Cuckoo				
Strigidae	*Ninox connivens*	Barking Owl				
	Ninox novaeseelandiae	Boobook Owl				
Tytonidae	*Tyto javanica*	Barn Owl				
Halcyonidae	*Dacelo novaeguineae*	Laughing Kookaburra		Y	1+calls	D-B
	Todiramphus s. sanctus	Sacred Kingfisher				
Meropidae	*Merops ornatus*	Rainbow Bee-eater				
Maluridae	*Malurus elegans*	Red-winged Fairy-wren				
	Malurus splendens	Splendid Fairy-wren			7	D-B
	Stipiturus malachurus	Southern Emu-wren				
Acanthizidae	*Acanthiza apicalis*	Broad-tailed Thornbill (Inland Thornbill)				
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill				
	Acanthiza inornata	Western Thornbill				
	Acanthiza sp. indet.	Thornbill indet.				D-B
	Gerygone fusca fusca	Western Gerygone				
	Sericornis frontalis	White-browed Scrubwren				
	Smicrornis brevirostris	Weebill				
Pardalotidae	*Pardalotus punctatus*	Spotted Pardalote				
	Pardalotus striatus	Striated Pardalote				
Meliphagidae	*Acanthorhynchus superciliosus*	Western Spinebill				
	Anthochaera carunculata	Red Wattlebird			>10	D-B
	Anthochaera lunulata	Western Little Wattlebird				
	Epthianura albifrons	White-fronted Chat				
	Glyciphila melanops	Tawny-crowned Honeyeater				
	Lichenostomus virescens	Singing Honeyeater			4	D-B
	Lichmera indistincta	Brown Honeyeater				
	Melithreptus lunatus (chloropsis)	White-naped Honeyeater				
	Phylidonyris niger	White-cheeked Honeyeater				
	Phylidonyris novaehollandiae	New Holland Honeyeater				D-B
Neosittidae	*Daphoenositta chrysoptera pileata*	Varied Sittella, Black-capped Sitella				

Family	Species Name	Common Name	Habitat	Cons. Code	Armstrong Res.	Other in area
Campephagidae	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike				
	Lalage tricolor	White-winged Triller				
Pachycephalidae	*Colluricincla harmonica*	Grey Shrike-thrush				
	Pachycephala pectoralis fuliginosa	Golden Whistler				
	Pachycephala rufiventris	Rufous Whistler				
Artamidae	*Artamus cinereus*	Black-faced Woodswallow				
	Artamus cyanopterus	Dusky Woodswallow				
	Cracticus nigrogularis	Pied Butcherbird				
	Cracticus tibicen dorsalis	Australian Magpie, White-backed Magpie			14+	D-B
	Cracticus torquatus	Grey Butcherbird			7+	D-B
	Strepera versicolor	Grey Currawong				
Rhipiduridae	*Rhipidura albiscapa*	Grey Fantail				D-B
	Rhipidura leucophrys	Willie Wagtail			1	D-B
Corvidae	*Corvus bennetti*	Little Crow				
	Corvus coronoides	Australian Raven			7+	D-B
Monarchidae	*Grallina cyanoleuca*	Magpie-lark				Duns.
Petroicidae	*Eopsaltria georgiana*	White-breasted Robin				
	Eopsaltria griseogularis	Western Yellow Robin				
	Petroica boodang	Scarlet Robin				
Acrocephalidae	*Acrocephalus australis*	Australian Reed Warbler				
Megaluridae	*Cincloramphus cruralis*	Brown Songlark				
Timaliidae	*Zosterops lateralis gouldi*	Grey-breasted White-eye, Silvereye			calls	D-B
Hirundinidae	*Hirundo neoxena*	Welcome Swallow			3	Duns.
	Petrochelidon ariel	Fairy Martin				
	Petrochelidon nigricans	Tree Martin				
Nectariniidae	*Dicaeum hirundinaceum*	Mistletoebird				
Estrilidae	*Stagonopleura oculata*	Red-eared Firetail			?calls	
Motacillidae	*Anthus novaeseelandiae*	Australian Pipit				
MARINE VERTEBRATES						
Balaenopteridae	*Balaenoptera bonaerensis*	Antarctic Minke Whale	Marine			
	Balaenoptera physalus	Fin Whale	Marine	T		
	Balaenoptera musculus	Blue Whale	Marine	EN		
	Balaenoptera musculus brevicauda	Pygmy Blue Whale	Marine	T		
	Megaptera novaeangliae	Humpback Whale	Marine	VU		
Delphinidae	*Globicephala melas*	Long-finned Pilot Whale	Marine			
	Tursiops truncatus	Bottlenose Dolphin	Marine			
Physeteridae	*Physeter macrocephalus*	Sperm Whale	Marine	P4		
Otariidae	*Neophoca cinerea*	Australian Sea-lion	Marine	S		
Cheloniidae	*Caretta caretta*	Loggerhead Turtle	Marine	T		
Elapidae	*Hydrophis elegans*	Bar-bellied Sea-snake	Marine			

Family	Species Name	Common Name	Habitat	Cons. Code	Armstrong Res.	Other in area
	Pelamis platura	Yellow-bellied Sea-snake	Marine			
INVERTEBRATES						
	Trapezites argenteoornatus	Silver-spotted Skipper				
	Myrmecia sp.	Bullant (red with black abdomen)			nests	
	Westralunio carteri	Parasitic Mussel	freshwater			
	Engaewa reducta	Dunsborough Burrowing Crayfish	swamp	EN		

Appendix Two: Habitat and Fauna Photographs

Plate 1. Armstrong Reserve habitat

Plate 2. Armstrong Reserve habitat (drainage line)

Plate 3. *Pseudocheirus occidentalis*, Western Ringtail Possum (Armstrong Reserve)

Plate 4. *Pseudocheirus occidentalis*, Western Ringtail Possum in drey (Armstrong Reserve)

Appendix Three: WRP Habitat Tree Raw Data

All Peppermint Trees Recorded

Waypoint #	DBH			
	10 - 50 mm	51 - 1000 mm	> 1000 mm	Impacted
1	19			
2		55		Y
3		74		Y
4		93		Y
5		81		Y
6		150		Y
7		70		Y
8		350		Y
9		420		Y
10		220		Y
11		200		
12			1200	
13		360		Y
14		450		Y
15	47			Y
16		80		Y
17		240		Y
18		970		Y
19		280		Y
20		160		Y
21		400		Y
22		320		Y
23		270		Y
24		340		Y
25		590		Y
26		270		Y
27		570		Y
28		70		Y
29	45			Y
30		600		Y
31		80		Y
32		120		Y
33		240		Y
34		240		Y
35	15			Y
36			1100	Y

Waypoint #	DBH			
37	13			Y
38		600		Y
39			1000	Y
40		220		Y
41		120		Y
42		120		Y
43		70		Y
44		130		Y
45		300		Y
46		400		Y
47		360		Y
48	50			Y
49		300		Y
50		150		Y
51	16			Y
52	15			Y
53		190		Y
54	48			Y
55	20			Y
56	25			Y
57	30			Y
58		200		Y
59		200		Y
60		60		Y
61		60		Y
62		100		Y
63		70		Y
64		100		
65		800		Y
66		100		Y
67		100		Y
68		150		Y
69		150		Y
70		120		Y
71		100		Y
72		600		Y
73		500		Y
74	50			Y
75		250		Y
76	30			Y
77	40			Y
78		60		Y
79		90		Y

Waypoint #	DBH			
80	30			Y
81	30			Y
82	40			Y
83	50			Y
84		100		Y
85		90		Y
86	20			Y
87	50			Y
88		300		Y
89		170		Y
90	50			
91	20			
92	20			
93		400		Y
94		200		Y
95		300		Y
96		170		Y
97	20			Y
98	50			Y
99		250		Y
100	50			Y
101		400		Y
102	40			Y
103		500		Y
104	20			Y
105		400		Y
106	30			Y
107		60		Y
108		400		Y
109		900		Y
110	50			Y
111	40			Y
112	20			
113	20			Y
114	50			Y
115		65		Y
116		90		Y
117	40			Y
118		80		Y
119		60		Y
120		70		Y
121		60		Y
122		300		

Waypoint #	DBH			
123	20			
124		70		
125		450		
126		90		
127	15			
128		60		
129		90		
130		280		
131		420		
132		120		
133		350		
134		900		
135		340		
136		180		
137		120		
138	30			
139		70		
140	20			
141	20			
142		250		
143	50			
144		150		
145	40			
146		100		
147	50			
148	30			
149		250		
150		150		
151	30			
152		60		
153	40			
154		100		
155	40			
156		70		
157		600		
158	30			
159		110		
160		100		
161		500		
162		120		
163	50			
164		300		
165		90		

Waypoint #	DBH			
166	50			
167	40			
168	40			
169		180		
170		320		
171		410		
172		300		
173		350		
174	50			
175		250		Y
176		200		Y
177	50			Y
178	30			Y
179		70		Y
180		250		Y
181		70		Y
182		200		Y
183		60		Y
184		70		Y
185		70		Y
186		800		Y
187		170		
188		600		
189		740		
190		240		
191	40			
192	50			
193	50			
194		300		
195	30			
196	50			
197		200		
198		290		
199		190		
200		100		Y
201	50			
202	20			
203	25			
204		300		
205		60		
206		180		
207		190		
208		70		

Waypoint #	DBH			
209		130		
210	40			
211		240		
212		100		
213	30			
214	40			
215	40			
216		250		
217	15			
218		110		
219		280		
220		110		
221		60		
222	30			
223	50			
224	30			
225		700		
226	20			
227		250		
228		800		
229		320		
230	20			
231		70		
232		500		
233		130		
234		390		
235		260		Y
236	30			Y
237		120		Y
238		410		Y
239	50			Y
240		100		
241		60		
242	50			
243		190		
244		210		Y
245		70		Y
246		110		Y
247		420		Y
248		210		Y
249		200		Y
250		60		Y
251		75		Y

Waypoint #	DBH			
252		550		Y
253		250		Y
254		100		Y
255		320		Y
256		240		Y
257		310		Y
258		60		Y
259		420		Y
260		60		Y
261		280		Y
262	20			Y
263	40			Y
264	50			Y
265		700		Y
266		720		Y
267		520		Y
268		460		Y
269		60		Y
270		250		Y
271		120		Y
272		150		Y
273	50			Y
274		100		Y
275		550		Y
276	50			Y
277		320		Y
278		220		Y
279	20			Y
280	20			Y
281	15			Y
282	40			
283		75		Y
285	40			Y
286	30			Y
287		60		
288		70		
289		50		Y
294		60		Y
295		65		
296		75		