COTERRA ENVIRONMENT

Native Vegetation Clearing Permit Application: Area Permit

Lots 91, 101 and 200 Anstey Road, Forrestdale

Revision 0, May 2019

CALIBRE | COMMITMENT | COLLABORATION

Native Vegetation Clearing Permit Application

Area Permit

Lots 91, 101 and 200 Anstey Road, Forrestdale

Revision 0, May 2019

This report was prepared by:

Coterra Pty Ltd trading as COTERRA ENVIRONMENT
ABN: 92 143 411 456

Our Ref: CEDFOR12
Author(s): K.Cooper
Reviewer: S. Harley
Report Version: Revision 0
Date: May 2019

This report was prepared for:

Terra Property Pty Ltd (subsidiary of Cedar Woods Properties Limited)
50 Colin Street
WEST PERTH WA 6055

TABLE OF CONTENTS Page

TABLES (Compiled within the report) Page

FIGURES (Compiled at the end of the report)

APPENDICES

1.0 INTRODUCTION

1.1 Overview

Terra Property Pty Ltd (Cedar Woods Properties Ltd) is proposing to develop Lots 91, 101 and 200 Anstey Road, Forrestdale (subject area) for urban purposes. The subject area lies within the City of Armadale with the location and extent presented in Figure 1.

An application to amend the Metropolitan Region Scheme (MRS) for the site and adjacent landholdings (MRS Amendment 1290-57) was assessed by the Western Australian Planning Commission (WAPC). The amendment was approved and advertised in the Government Gazette on 13 October 2015. The subject area is now zoned under the MRS as 'Urban', and 'General Rural' under the City of Armadale's Local Planning Scheme (LPS) No. 4.

The project is now progressing through a LPS amendment and Local Structure Plan (LSP) assessment stages. The advertisement period for the LSP has closed. A copy of the LSP is provided in Appendix A.

A Western Australia Planning Commission (WAPC) subdivision planning approval is proposed to be submitted in accordance with the *Planning and Development Act 2005* in June/July 2019.

1.2 Proposed Clearing

For project timing purposes it is proposed to clear a portion of the subject area (the site) as part of the bulk earthworks and civil construction works. These works are proposed to be undertaken in September 2019, prior to the issuing of the WAPC subdivision approval.

Terra Property Pty Ltd (Cedar Woods Properties Ltd) is proposing to clear (the site) approximately 4.17ha of remnant vegetation (which comprises of 0.79ha of 'Mr' vegetation unit, 2.03ha of 'Kg' vegetation unit, 0.75ha of planted trees and remnant endemic and 0.6ha Cleared ground with scattered trees of *Melaleuca preissiana* trees. (Figure 1). A Development Application for the proposed works has been issued to the City of Armadale.

2.0 EXISITING ENVIRONMENT

2.1 Topography and soils

Topography of the clearing area (the site) is relatively flat, at approximately 23 to 24m Australian Height Datum (mAHD) (Figure 2).

Regional Geology Mapping by Jordan (1986) indicates that most of the site contains Sand (S10) which is characterised by relatively thin sand veneer over strong, blocky, brown silts and clays. Refer to Figure 2.

2.2 Hydrology

Regional groundwater mapping obtained from the DWER Perth Groundwater Atlas, indicates that Average Annual Maximum Groundwater Level (AAMGL) occurs at a depth of approximately 23m AHD across the site and groundwater flow is generally in a north east direction (Figure 3). It has been estimated that depth to groundwater within the site is approximately 2 to 3 m below natural ground level (DWER 2019).

There is a geomorphic Multiple Use Wetland (UFI 14897) which slightly impinges the site within Lots 91 and 101, refer to Figure 3.

2.3 Vegetation and Flora

2.3.1 Overview

The site has been mapped by Beard (1981) as 'Allocasuarina – Banksia Low Woodland with scattered *Eucalyptus marginata* (abbreviated e2,bLi)'. The site is a combination of the Bassendean dunes and Pinjarra plan which supports the Southern River vegetation complex which is predominantly 'Open woodland of *Corymbia calophylla* – *E. marginata* – Banksia spp. with fringing woodland of *E. rudis* – *M. rhaphiophylla* along creek beds' (Heddle et al., 1980).

South West vegetation Complex Statistics Report (2017) indicates that approximately 18.4% of the Southern River Complex is remaining in the Swan Coastal Plan (SCP) with approximately 1.1% protected for conservation within the SCP.

The site is not within or directly adjacent to Bush Forever sites or regional parks. The Jandakot Regional Park (Bush Forever Site 342) is located approximately 190m north east and 268m north west of the site, and covers an area of approximately 2,300 ha (DEC, 2010).

2.3.2 Site Survey

A flora and vegetation survey was completed by Bennett Environmental Consulting (Dr Eleanor Bennett) in 2013 for Lots 101 and 200 (which includes the clearing area) in accordance with the Level 2 requirements presented in EPA Guidance Statement No. 51 – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2004). The first part of the survey was completed in May 2013 for the site and a subsequent site assessment to complete the Level 2 survey requirements was undertaken in late October 2013 (refer to Appendix B).

Two Vegetation Units have been mapped as occurring within the clearing area:

- Kg: Open Low Woodland B of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Open to Dense Tall Sedges of *Lepidosperma longitudinale*. (2.03ha of ha)
- Mr: Low Woodland B of *Melaleuca preissiana, Corymbia calophylla, Nuytsia floribunda* and *Allocasuarina fraseriana* over Open Scrub *of Kunzea glabrescens* over Heath A of *Regelia ciliata* over Open Dwarf Scrub D of mixed taxa over Very Open Tall Sedges of *Dasypogon bromeliifolius* and *Phlebocarya ciliata*. (0.79ha)

Other areas were mapped as, P:

- Planted trees and remnant endemic trees (0.75ha)
- Cleared ground with scattered trees of *Melaleuca pressiana* (0.6ha)

One quadrat was established in each vegetation unit Mr (AN07) and Kg (AN06). A species list is provided in Botanical Report (Appendix B). A priority 3 *Jacksonia gracillima* shrub was located within AN07. No additional significant flora were recorded during the October survey (BEC, 2019).

During the 2013 survey, the vegetation condition of vegetation unit Mr was recorded to be in 'Very Good' to 'Excellent' condition. Vegetation unit Kg was recorded to be in 'Degraded' to 'Completely Degraded' condition (Keighery, 1994) (BEC, 2013) (Figure 5).

2.4 Fauna Habitat

Bamford Consulting Ecologists (BCE) (2013) undertook a Level 1 fauna assessment (desktop review and site inspection) for the site. The field survey was undertaken in May 2013 and included several components:

- targeted searching for conservation significant fauna;
- opportunistic fauna observations; and
- habitat assessment.

Vegetation and Substrate Associations (VSAs) throughout the site were assessed during the desktop review and as part of the field investigations. Within the site, each major VSA was visited to develop an understanding of major fauna habitat types present and to assess the likelihood of conservation significant species being present in the area (these are further discussed in the following section). During the site visit significant species that were recorded during the desktop assessment were investigated this included searching for evidence of their activities (e.g. scats, tracks, diggings, burrows) or listening for their call.

Two VSA were recorded within the clearing area

- Very open Melaleuca shrubland over pasture (VSA1): generally of low value as habitat and likely to be low in biodiversity, may provide foraging habitat for Glossy Ibis, Rainbow Bee-eater, Western Corella and Quenda.

- Closed Melaleuca shrubland (VSA2): support Quenda and Brush Wallaby, important for a range of CS3 birds such as fairy-wrens and thornbills. Low value for foraging by Carnaby's Black Cockatoo (Figure 6).

VSA1 is likely to be low in biodiversity values. The fauna assemblage present on site has already been impacted by feral species, extensive clearing and weed invasion. VSA2 may contain some Carnaby's Black Cockatoo foraging habitat. There are no potential breeding habitat trees within the site (breast diameter height DBH >500mm) (BCE, 2013).

Three *Corymbia calophylla* (Marri) trees were recorded within vegetation unit 'Mr' (Arborlogic, 2013). Marri is a species used by the Carnaby's Black Cockatoo for feeding, nesting and roosting (Groom, 2011).

3.0 ASSESSMENT AGAINST TEN CLEARING PRINCIPLES

An assessment of the proposed clearing against the ten clearing principles outlined in Schedule 5 of the *Environmental Protection Act 1986* is provided in Table 1.

Table 1: Assessment against clearing principles

Principle	Assessment	Conclusion
Native vegetation should not be cleared if it comprises a high level of biological diversity.	The site is currently located within a rural landholdings which has been subject to grazing and clearing activities associated which historical landuses. Based on available historical aerial photography (Landgate, 2019) The site was cleared in the mid-1974. with some regeneration of 'Mr" evident in 1979. Regeneration of 'Kg' area is visible between 1995 and 2000). 2.03ha of Kg vegetation unit is in 'Degraded' to 'Completely Degraded' condition. No priority or declared rare flora (DRF) species have been recorded within this vegetation unit (BEC, 2013). 'Mr' vegetation unit (0.79ha) was in 'Very Good' condition (Figure 5) and one P3 species- *Jacksonia gracillima*. No DRF or threatened ecological community was recorded within the Vegetation Unit. The remaining of the site (1.35hba) consists of Cleared ground with scattered trees of *Melaleuca preissiana* and planted trees and remnant endemic trees (Figrue 4). The site does not contain black cockatoo habitat (breeding) trees (3x Marri), but does contain some foraging potential within the VSA2 Closed Melaleuca shrubland (figure 6).	Not at variance with the principle.
Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia.	Two VSA were recorded within the clearing area • Very open Melaleuca shrubland over pasture (VSA1): generally of low value as habitat and likely to be low in biodiversity, may provide foraging habitat for Glossy Ibis, Rainbow Bee-eater, Western Corella and Quenda. • Closed Melaleuca shrubland (VSA2): support Quenda and Brush Wallaby, important for a range of CS3 birds such as fairy-wrens and thornbills. Low value for foraging by Carnaby's Black Cockatoo (Figure 6). VSA1 which is likely to be low in biodiversity values. The fauna assemblage present on site has already been impacted by feral species, extensive clearing and weed invasion. VSA2 may contain some Carnaby's Black Cockatoo foraging habitat. There are no potential breeding habitat trees within the site (breast diameter height DBH >500mm) (BCE, 2013). Three *Corymbia calophylla* (Marri) trees were recorded within vegetation unit 'Mr' (Arborlogic, 2013). Marri is a species used by the Carnaby's Black Cockatoo for feeding, nesting and roosting (Groom, 2011).	The size of habitat in regard to other available habitat within the vicinity of the site (Bush Forever site 342/Jandakot Regional Parks site) will not lead to a reduction of species occupancy in the immediate area. Therefore, not considered to be at variance with this principle.

Principle	Assessment	Conclusion
Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora.	A flora and vegetation survey was completed by Bennett Environmental Consulting (Dr Eleanor Bennett) in 2013 for Lots 101 and 200 (which includes the clearing area) in accordance with the Level 2 requirements presented in EPA Guidance Statement No. 51 – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2004). No DRF were recorded during the survey. A priority 3 *Jacksonia gracillima* shrub was located within AN07. No additional significant flora were recorded during the October survey (BEC, 2019) (Figure 4). P3 are poorly known species it is indicated that the species are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them (DBCA, 2019).	While a P3 individual plant was located within vegetation unit 'Mr' the proposed action is not at significant variance with this principle.
Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community.	A flora and vegetation survey was completed by Bennett Environmental Consulting (Dr Eleanor Bennett) in 2013 for Lots 101 and 200 (which includes the clearing area) in accordance with the Level 2 requirements presented in EPA Guidance Statement No. 51 – Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2004). No TECs were recorded within the site.	Not at variance with the principle.
Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.	The vegetation proposed to be cleared within the site is not considered as significant. Areas of vegetation to be retained (and classed as significant) that have been endorsed by EPA/DWER/DBCA through the MRS and LPS processes (refer to Section 101) have been depicted in the LSP (Appendix A). The clearing of the site is in accordance with the LSP (Appendix A).	Removal of vegetation within the project area is not considered to be at variance with this principle as it will not result in the removal of significant remnant of vegetation compared to the surrounding area.
Native vegetation should not be cleared if it is growing in or in association with a watercourse or wetland.	There is a geomorphic Multiple Use Wetland (MUW) (UFI 14897) which slightly impinges the site within Lots 91 and 101, refer to Figure 3. The MUW within Lot 91 is fully cleared containing pasture. Within lot 101, the MUW is predominantly cleared ground with scattered trees of *Melaleuca preissiana* (Figure 4) and vegetation within this area has been recorded as 'Completely Degraded' (Figure 5).	Not at significant variance with the principle.
Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	The site will be cleared in accordance with the civil contractors/engineers Construction Environmental Management Plan for the commencement of Stage 1 (42 lot) and Stage 2 (48 lots) urban subdivision.	Removal of vegetation within the site is not considered to be at variance with this principle.
Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.	The site is not within or adjacent to Bush Forever sites or Regional Parks. The Jandakot Regional Park (Bush forever Site 342) is located approximately 190m north east and 268m north west of the site. Clearing of the site will be contained and undertaken in accordance with the civil contractors/engineers Construction Environmental Management Plan.	The proposed action is not at variance with this principle.

Principle	Assessment	Conclusion
Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.	There is an approved Local Water Management Strategy (LWMS) (Hyd2O, 2018). The LWMS addresses key elements of the water management strategy for the site include: a) the provision of regional flood storage along Baileys Branch Drain, b) treatment and infiltration of stormwater for development areas adjacent to existing wetlands, c) the agreed use of the DBNGPC for flood storage during major events, and d) the implementation of additional precautionary measures to provide safeguards for the hydrology of Bush Forever Site 342. The LWMS was prepared in accordance with the principles, objectives, and key criteria of Better Urban Water Management (Western Australian Planning Commission, 2008) and the overarching Anstey Road Forrestdale District Water Management Strategy. An 18-month groundwater level and water quality monitoring programme undertaken from 2013-2014 plus additional monitoring during winter 2016 has been used to inform the development of the LWMS (Hyd2O, 2018). Implementation of the LWMS will be undertaken in accordance with Better Urban Water Management through the development and implementation of Urban Water Management Plans for individual stages of development within the subject area through WAPC subdivision approval.	The proposed action is not at variance with this principle.
Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the intensity of flooding.	There is an approved Local Water Management Strategy (LWMS) (Hyd2O, 2018) Clearing vegetation within the proposed area will not cause, or exacerbate, the intensity of flooding, in the subject area. The LWMS included the proposed clearing areas within the major and minor drainage system/design strategy which is consistent with the objectives provided within the District Water Management Strategy.	Removal of vegetation within the site is not considered to be at variance with this principle, as the clearing is not expected to cause or exacerbate flooding in the area.

The following assessment in Table 1 demonstrates that the proposed removal of native vegetation, planted introduced species and weed species is not at a significant variance with the clearing principles.

4.0 REFERENCES

Arborlogic (2013) Preliminary Tree Survey assessment: Lots 101 and 200 Anstey road Forrestdale. Prepared for Coterra Environment.

Bennett Environmental Consulting (BEC) (2013) Botanical Assessment of Lots 101 and 200 Anstey Road, Forrestdale.

DBCA (2019) CONSERVATION CODES For Western Australian Flora and Fauna [online]

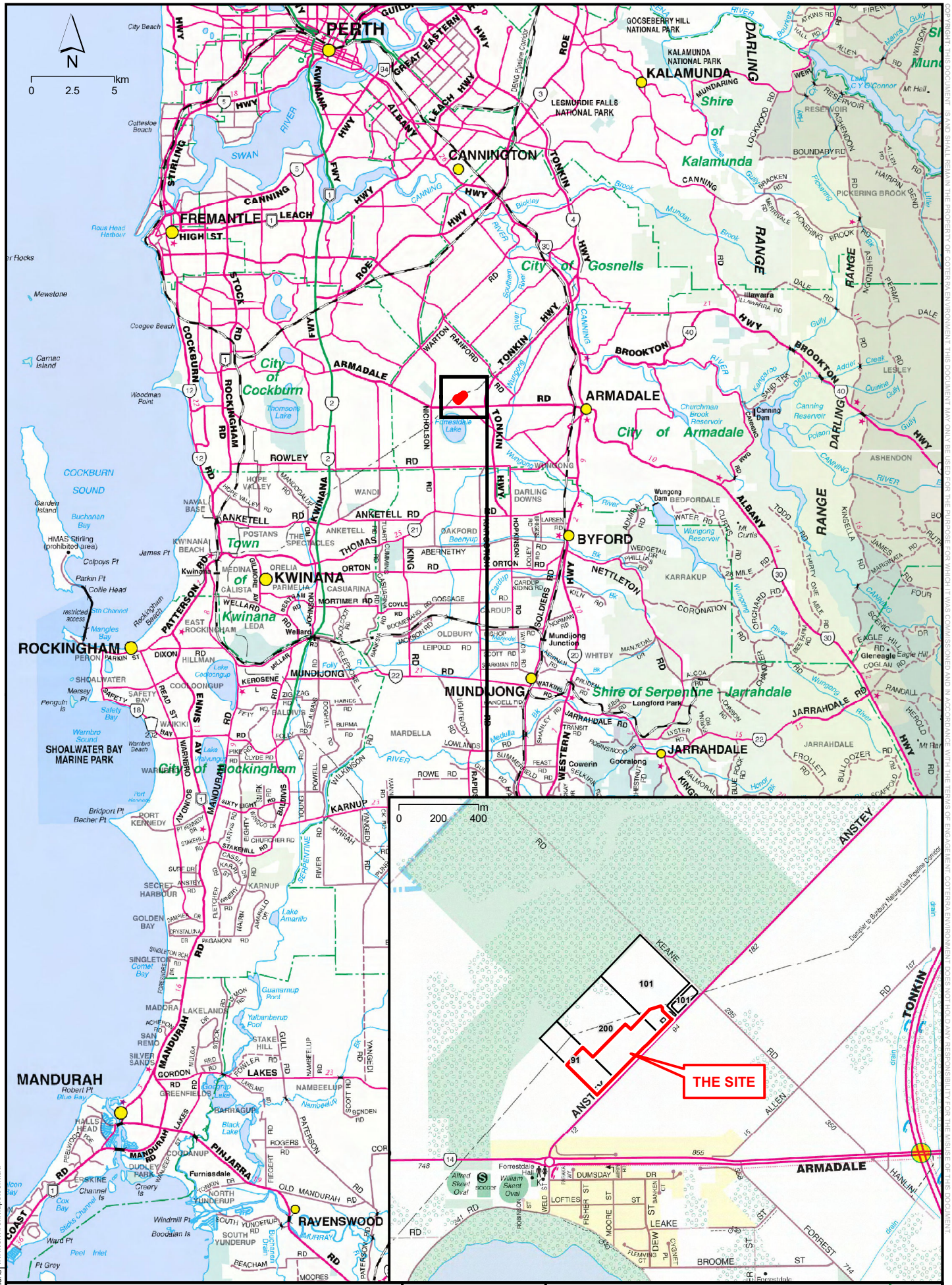
DEC (2010) Jandakot Regional Park management Plan

DWER (2019) Perth Groundwater Atlas [online]

Hyd2O (2018) Lot 91, 101 and 200 Anstey road Forestdale: Local Water management Strategy. Prepared for Terra Property Pty Ltd. September 2018.

Groom (2011) Plants Used by Carnaby's Black Cockatoo. List prepared by Christine Groom, Department of Environment and Conservation 15 April 2011.

FIGURES



ENVIRONMAPS | t: 0406 590 006 | www.environmaps.com.au
Environmental Mapping Solutions

COTERRA ENVIRONMENT

Job: CEDFOR12
Doc: 001
Date: 26/04/2019
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

Terra Property Pty Ltd (Cedar Woods Properties Ltd)
NVCP (AREA PERMIT)
PART LOTS 91, 100 and 200 ANSTEY ROAD

SITE LOCATION

Figure 1

C:\GIS\Jobs\CoTerra\CEDFOR12 - Pt Lots 200 and 101 Anstey Rd, NVCP (Area Permit)\Figures\CEDFOR12_F01 Site Location_190426.mxd

LEGEND

- The Site
- Lots of Interest
- Cadastre
- Easement
- Contour (mAHD)

Geology

- Sp1: PEATY SAND - grey to black, fine to medium-grained, moderately sorted quartz sand, slightly peaty, of lacustrine origin.
- S10: SAND - as S8 over sandy clay to clayey sand of the Guildford Formation, of eolian origin.

N

0 12.5 25 50 75 100 m

Scale: 1:3,000 @ A3
GDA 1994 MGA Zone 50

KEANE RD

LOT 101

LOT 101
Sp1

DBNGP CORRIDOR

LOT 200

S10

Sp1

LOT 91

Sp1

ANSTEY RD

Source: Contours - DoW
Cadastre - Landgate, 2018
Orthophoto - NearMaps, 24.02.19
Geology - Geological Survey of W.A., 1999

ENVIRONMAPS | t: 0406 590 006 | www.environmaps.com.au
Environmental Mapping Solutions

COTERRA ENVIRONMENT

Job: CEDFOR12
Doc: 002
Date: 26/04/2019
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

Terra Property Pty Ltd (Cedar Woods Properties Ltd)
NVCP (AREA PERMIT)
PART LOTS 91, 100 and 200 ANSTEY ROAD

TOPOGRAPHY AND SOILS

Figure 2

C:\GIS\Jobs\CoTerra\CEDFOR12 - Pt Lots 200 and 101 Anstey Rd, NVCP (Area Permit)\Figures\CEDFOR12_F02 Topography and Soils_190426.mxd

LEGEND

- The Site
- Lots of Interest
- Cadastre
- Easement
- Contour (mAHD)
- Maximum Groundwater Contour (mAHD)

Wetlands

- Conservation
- Resource Enhancement
- Multiple Use

N

0 12.5 25 50 75 100 m

Scale: 1:3,000 @ A3
GDA 1994 MGA Zone 50

UFI 14937
UFI 14891
UFI 15428
UFI 15427
UFI 14170
UFI 14876
UFI:15183
UFI 14165
UFI 14893
UFI:14897
UFI 14883
UFI 15429
KEANE RD
ANSTEY RD
DBNGP CORRIDOR
LOT 101
LOT 101
LOT 200
LOT 91

Source: Contours - DoW
Wetlands - DBCA, 2019
Cadastre - Landgate, 2018
Orthophoto - NearMaps, 24.02.19
Groundwater Contours - DWER, 2010

COTERRA ENVIRONMENT

Job: CEDFOR12
Doc: 003
Date: 26/04/2019
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

Terra Property Pty Ltd (Cedar Woods Properties Ltd)
NVCP (AREA PERMIT)
PART LOTS 91, 100 and 200 ANSTEY ROAD

HYDROLOGY

Figure 3

C:\GIS\Jobs\CoTerra\CEDFOR12 - Pt Lots 200 and 101 Anstey Rd, NVCP (Area Permit)\Figures\CEDFOR12_F03 Hydrology_190426.mxd

LEGEND

- The Site
- Lots of Interest
- Cadastre
- Easement
- Quadrat Location

Vegetation Units

- Kg: Open Low Woodland B of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Open to Dense Tall Sedges of *Lepidosperma longitudinale*.
- MR: Low Woodland B of *Melaleuca preissiana, Corymbia calophylla, Nuytsia floribunda* and *Allocasuarina fraseriana* over Open Scrub of *Kunzea glabrescens* over Heath A of *Regelia ciliata* over Open Dwarf Scrub D of mixed
- P: Planted trees and remnant endemic trees.:
- C: Cleared ground with scattered trees of *Melaleuca preissiana.*

N

0 12.5 25 50 75 100 m

Scale: 1:2,000 @ A3
GDA 1994 MGA Zone 50

LOT 101
DBNGP CORRIDOR
LOT 200
LOT 91
EXTENT OF VEGETATION SURVEY
ANSTEY RD
C
AN06
Kg
C
P
AN07
MR

Source: Cadastre - Landgate, 2018
Orthophoto - NearMaps, 24.02.19

ENVIRONMAPS | t: 0406 590 006 | www.environmaps.com.au | Environmental Mapping Solutions

C:\GIS\Jobs\CoTerra\CEDFOR12 - Pt Lots 200 and 101 Anstey Rd, NVCP (Area Permit)\Figures\CEDFOR12_F04 Vegetation and Flora_190429.mxd

COTERRA ENVIRONMENT

Job: CEDFOR12
Doc: 004
Date: 29/04/2019
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

Terra Property Pty Ltd (Cedar Woods Properties Ltd)
NVCP (AREA PERMIT)
PART LOTS 91, 100 and 200 ANSTEY ROAD

VEGETATION AND FLORA

Figure 4

LEGEND

- The Site
- Lots of Interest
- Cadastre
- Easement

N

0 12.5 25 50 75 100 m

Scale: 1:2,000 @ A3
GDA 1994 MGA Zone 50

Vegetation Condition

1: Pristine Pristine or nearly so, no obvious signs of disturbance.

2: Excellent Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.

3: Very Good Vegetation structure altered, obvious signs of disturbance.

4: Good Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.

5: Degraded Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.

6: Completely Degraded The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

DBNGP CORRIDOR

LOT 200

LOT 91

EXTENT OF VEGETATION SURVEY

ANSTEY RD

6

5-6

6

5-6

2-3

Source: Cadastre - Landgate, 2018
Orthophoto - NearMaps, 24.02.19

ENVIRONMAPS Environmental Mapping Solutions t: 0406 590 006 www.environmaps.com.au

COTERRA ENVIRONMENT

Job: CEDFOR12
Doc: 005
Date: 26/04/2019
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

Terra Property Pty Ltd (Cedar Woods Properties Ltd)
NVCP (AREA PERMIT)
PART LOTS 91, 100 and 200 ANSTEY ROAD

VEGETATION CONDITION

Figure 5

C:\GIS\Jobs\CoTerra\CEDFOR12 - Pt Lots 200 and 101 Anstey Rd, NVCP (Area Permit)\Figures\CEDFOR12_F05 Vegetation Condition_190426.mxd

LEGEND

- The Site
- Lots of Interest
- Cadastre
- Easement

Fauna Habitats

- Closed *Melaleuca shrubland.*
- Very open *Melaleuca shrubland* over pasture.

N

0 12.5 25 50 75 100 m

Scale: 1:2,000 @ A3
GDA 1994 MGA Zone 50

LOT 101

DBNGP CORRIDOR

LOT 200

LOT 91

ANSTEY RD

Source: Cadastre - Landgate, 2018
Orthophoto - NearMaps, 24.02.19

ENVIRONMAPS Environmental Mapping Solutions t: 0406 590 006 www.environmaps.com.au

COTERRA ENVIRONMENT

Job: CEDFOR12
Doc: 006
Date: 26/04/2019
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

Terra Property Pty Ltd (Cedar Woods Properties Ltd)
NVCP (AREA PERMIT)
PART LOTS 91, 100 and 200 ANSTEY ROAD

FAUNA HABITATS

Figure 6

C:\GIS\Jobs\CoTerra\CEDFOR12 - Pt Lots 200 and 101 Anstey Rd, NVCP (Area Permit)\Figures\CEDFOR12_F06 Fauna Habitats_190426.mxd

APPENDIX A – LOCAL STRUCTURE PLAN

This plan has no formal approval status and has been prepared by CLE to demonstrate one potential land use scenario for the land which could be investigated further by the Client. Implementation in any form would be subject to the receipt of all appropriate approvals. The plan may be changed without notice and should not be relied upon. This plan remains the property of CLE.

30m Buffer

GHS

Gas Pipeline Easement

CCW Core

50m Buffer

50m Buffer

3.5m Wide Low Fuel Zone.

KEANE RD

50m Buffer

16m Reserve

15.4m Reserve

13m Reserve

POS

POS (Shared)

POS / Drainage

91

200

101

552

136

GHS

ANSTEY ROAD

0 20 40 60 80 100m

CLE Town Planning + Design
www.cleplan.com.au

SUBDIVISION CONCEPT

Lots 91, 101 & 200 Anstey Road, Forrestdale

DRAFT

plan no: 2340-103C-01
date: 25 March 2019
scale: 1:2,000 @ A3

APPENDIX B – BOTANICAL ASSESSMENT

BOTANICAL ASSESSMENT OF LOTS 101 AND 200 ANSTEY ROAD, FORRESTDALE

Prepared for:
COTERRA ENVIRONMENT
19/336 Churchill Avenue,
SUBIACO WA 6008

Prepared by:
Bennett Environmental Consulting Pty Ltd

Sollya heterophylla

PO Box 341
KALAMUNDA 6926

November 2013

STATEMENT OF LIMITATIONS

Scope of Services

This report ("the report") has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Eleanor Bennett ("the Author"). In some circumstances a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services.

Reliance on Data

In preparing the report, the Author has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise stated in the report, the Author has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. The Author will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to the Author.

Environmental Conclusions

In accordance with the scope of services, the Author has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

The conclusions are based upon field data and the environmental monitoring and/or testing carried out over a limited period of time and are therefore merely indicative of the environmental condition of the site at the time of preparing the report. Also it should be recognised that site conditions, can change with time.

Within the limitations imposed by the scope of services, the field assessment and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for Benefit of Client

The report has been prepared for the benefit of the Client and no other party. The Author assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of the Author or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other Limitations

The Author will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report. The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

TABLE OF CONTENTS

SUMMARY

Bennett Environmental Consulting Pty Ltd was contracted to undertake a preliminary assessment of the vegetation at Lots 101 and 200 Anstey Road, Forrestdale. This preliminary assessment was undertaken on the 16th May 2013 with a spring assessment undertaken on 22nd October 2013. The site adjoins Bush Forever Site No. 342 and Jandakot Regional Park.

The May and October surveys resulted in:

- A total of 42 vascular plant families, 93 genera and 117 taxa;
- 37 introduced species;
- *Jacksonia gracillima* a Priority 3 Flora was recorded from 2 locations;
- One Floristic Community Type, FCT 4 – *Melaleuca preissiana* Damplands was inferred;
- Six vegetation units, all of which were small in area; and
- A vegetation condition varying from excellent to degraded.

The October survey was timed to target the flowering of the Threatened Flora, *Diuris purdiei* which could potentially have occurred in the area. None of these plants were located although an extensive search was undertaken.

1. INTRODUCTION

1.1 Background

Bennett Environmental Consulting Pty Ltd was contracted by Coterra Environment to undertake a preliminary assessment of the vegetation at Lots 101 and 200 Anstey Road, Forrestdale (the study site). This report includes the survey undertaken in May 2013 and the current one undertaken in October 2013.

Figure 1. Location of lots 101 and 200 Anstey Road - outlined in red (extracted from Google Maps)

From Figure 1 it can be seen that a large area of the site has been cleared with only a few nodes of remnant vegetation remaining. The bushland to northwest is Bush Forever Site No. 342 – Anstey/Keane Dampland and Adjacent Bushland, Forrestdale and to the northeast is Jandakot Regional Park.

1.2 Scope of Works

The requirements for this project were to:

i. Undertake a preliminary vegetation survey (Environmental Protection Authority, 2004);
ii. Search for and record all significant species at the site; and to undertake
iii. A spring survey.

2. BACKGROUND INFORMATION

2.1 Geology and Landform

The study site is included in the Bassendean landform unit. The sands are off white to pale grey at the surface and cream to yellow at depth. The sand was probably laid down on shorelines and dunes during past periods of relatively high sea levels. The deposit is poorly sorted quartz sand, mainly fine to medium grained.

2.2 Vegetation

The Interim Biogeographical Regionalisation for Australia (IBRA) (Thackway and Cresswell, 1995) recognizes 85 bioregions. The IBRA is used as the common unit to compare biological and biophysical attributes. Bioregions represent a landscape-based approach to classifying the land surface and each region is defined by a set of major environmental influences, which shape the occurrence of flora and fauna and their interaction with the physical environment. Forrestdale occurs in the Swan Coastal Plain SWA2 (Mitchell *et al*., 2002).

The survey lots are mapped by Beard (1981) as *Allocasuarina – Banksia* Low Woodland with scattered *Eucalyptus marginata* (abbreviated e2,bLi). Shepherd *et al.* (2002) have determined the pre-European and current extent of the vegetation associations described by Beard. In addition they have assessed the percentage of each vegetation association remaining, the amount in IUCN reserves and the percentage in other reserves. The pre-European area of e2,bLi is estimated to be 50,270ha, the current extent is 33,700ha which represents 67% remaining vegetated of which 70% is included in conservation.

Heddle *et al.* (1980) described the vegetation complexes of the Darling System at a scale of 1: 250 000. There was found to be a distinct pattern of plant distribution linked to landforms, soils and climate. The most obvious trend was associated with increasing aridity from west to east on the Darling Plateau. The vegetation changes observed were a decrease in height and percentage cover of the tallest stratum and a distinct change in floristics. The site is included in the Southern River Complex. Which is described as an Open Woodland of *Corymbia calophylla* - *Eucalyptus marginata* - *Banksia* species with fringing Woodlands of *Eucalyptus rudis* and *Melaleuca rhaphiophylla* along creek beds.

Bush Forever (Government of Western Australia, 2000) states there is 17% of the original area of the Southern River Complex remaining vegetated within the Swan Coastal Plain. The area proposed for protection (Government of Western Australia, 2000) is 10%. This vegetation complex is also included in Bush Forever Site No. 342 which adjoins the survey site.

2.3 Threatened Ecological Communities

An ecological community is a naturally occurring biological assemblage that occurs in a particular type of habitat. A Threatened Ecological Community is one which falls into one of the following categories, presumed totally destroyed, critically endangered, endangered or vulnerable (Department of Parks and Wildlife, 2013b).

A possible threatened ecological community which does not meet the above is added to the Priority Ecological Community List. Priorities 1, 2, and 3 are adequately known but are not currently believed to be threatened. Those that have recently been removed from the threatened list are listed as Priority 4. Conservation dependent ecological communities are placed in Priority 5.

2.4 Significant Flora

Prior to undertaking the field work a search was undertaken using NatureMap (Department of Environment and Conservation, 2013a.) to obtain a list of Threatened or Priority Flora that may occur in the area.

Table 1. Code and description of Threatened and Priority Flora (Department Parks and Wildlife, 2013a)

Code	Declared Rare and Priority Flora Categories
T	T (Threatened) -Extant Taxa. Taxa, which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection.
X	DRF (Declared Rare Flora) -Presumed Extinct Taxa. Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently.
1	Priority One -Poorly Known Taxa. Taxa, which are known from one or a few (generally <5) populations, which are under threat.
2	Priority Two -Poorly Known Taxa. Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat.
3	Priority Three -Poorly Known Taxa. Taxa, which are known from several populations, at least some of which are not believed to be under immediate threat.
4	Priority Four -Rare Taxa. Taxa which are considered to have been adequately surveyed and which whilst being rare, are not currently threatened by any identifiable factors.

Table 1 presents the definitions of Declared Rare and the four Priority Flora ratings under the Wildlife Conservation Act (1950) as extracted from Department of Parks and Wildlife (2013a). Table 2 presents the definitions of the threatened species under the Environmental Protection and Biodiversity Conservation Act, 1999 (Department of Sustainability, Environment. Water. Populations and Communities, 2013). Table 3 lists those taxa recorded from the Forrestdale area.

Table 2. Categories of Threatened Flora Species (Department of Sustainability, Environment. Water. Populations and Communities , 2013)

Code	Declared Rare and Priority Flora Categories
Ex	Extinct Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of this species has died.
ExW	Extinct in the Wild Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	Critically Endangered Taxa which at any particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	Endangered Taxa, which is not critically endangered, and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	Vulnerable Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	Conservation Dependent Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Table 3. Threatened and Priority Flora Species List recorded from the area with the description extracted from Florabase (Western Australian Herbarium, 2013)

Taxon	Code	Description
Caladenia huegelii	T	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red, Sep to Oct. Grey or brown sand, clay loam.
Diuris purdiei	T	Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow, Sep to Oct. Grey-black sand, moist. Winter-wet swamps.
Drakaea elastica	T	Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red & green & yellow, Oct to Nov. White or grey sand. Low-lying situations adjoining winter-wet swamps.
Drakaea micrantha	T	Tuberous, perennial, herb, 0.15-0.3 m high. Fl. red & yellow, Sep to Oct. White-grey sand.
Lepidosperma rostratum	T	Rhizomatous, tufted perennial, grass-like or herb (sedge), 0.5 m high. Fl. brown. Peaty sand, clay.
Eryngium pinnatifidum subsp. *palustre*	3	Erect perennial, herb, 0.15-0.5 m high. Fl. white/blue, Oct to Nov. Clay, sandy clay. Claypans, seasonally wet flats.
Jacksonia gracillima	3	No description provided.
Stylidium longitubum	3	Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. pink, Oct to Dec. Sandy clay, clay. Seasonal wetlands.
Drosera occidentalis subsp. *occidentalis*	4	Fibrous-rooted, rosetted perennial, herb, to 0.01 m high. Fl. pink/white, Nov to Dec. Sandy & clayey soils. Swamps & wet depressions.
Grevillea thelemanniana subsp. *thelemanniana*	4	No description provided.
Jacksonia sericea	4	Low spreading shrub, to 0.6 m high. Fl. orange, usually Dec or Jan to Feb. Calcareous & sandy soils.
Ornduffia submersa	4	No description provided.
Thysanotus glaucus	4	Caespitose, glaucus perennial, herb, 0.1-0.2 m high. Fl. purple, Oct to Dec or Jan to Mar. White, grey or yellow sand, sandy gravel.
Tripterococcus paniculatus	4	Perennial, herb, to 1 m high. Fl. yellow-green, Oct to Nov. Grey, black or peaty sand. Winter-wet flats.
Verticordia lindleyi subsp. *lindleyi*	4	Erect shrub, 0.2-0.75 m high. Fl. pink, May or Nov to Dec or Jan. Sand, sandy clay. Winter-wet depressions.

2.5 Bush Forever Site No 342

The Anstey/Keane Dampland and Adjacent Bushland – Bush Forever Site No. 342 occurs adjacent to the survey site along the north western boundary. Site No. 342 is 311ha in area. It includes the Bassendean Sands, Bassendean Sands over the Guildford Formation and Holocene Swamp Deposits.

The vegetation of Bush Forever site 342 is described as (Government of Western Australia, 2000):

Uplands:

Banksia attenuata and *Banksia menziesii* and *Allocasuarina fraseriana* Low Woodland to Low Open Forest, with scattered *Eucalyptus marginata* subsp. *marginata*, *Eucalyptus todtiana* and *Nuytsia floribunda*; *Banksia attenuata* Low Woodland; and
Banksia ilicifolia Low Open Forest to Woodland.

Wetlands:

Banksia attenuata and *Melaleuca preissiana* Low Woodland;
Melaleuca preissiana Low Woodland;
Kunzea glabrescens Tall Open Scrub;
Tall Closed Scrub to Tall Open Scrub dominated by *Melaleuca rhaphiophylla;*
Melaleuca viminea and *Melaleuca uncinata* or combination of these;

Closed Heath to Open Heath dominated by Melaleuca rhaphiophylla;
Melaleuca teretifolia, Melaleuca viminea, Melaleuca incana, Melaleuca uncinata, Melaleuca lateriflora and *Melaleuca lateritia* or combination of these;
Actinostrobus pyramidalis Closed Tall Scrub to Tall Open Shrubland*;*
Regelia ciliata Closed to Open Heath*;*
Verticordia densiflora Closed to Open Heath*;*
Pericalymma ellipticum Closed to Open Heath; and
Evandra pauciflora Sedgeland.

Significant Flora Recorded were:

Diuris purdiei (T); *Jacksonia sericea* (P3), *Tripterococcus paniculatus* (P1), *Stylidium longitubum* (P3), *Ornduffia submersa* (P4), *Verticordia lindleyi* subsp. *lindleyi* (P4) and *Drosera occidentalis* subsp. *occidentalis* (P4). In addition this report lists other taxa of significant occurrence on the Swan Coastal Plain.

The Floristic Community Types (Gibson *et. al.*, 1994) recorded as occurring at Site 342 are:

FCT 4 – *Melaleuca preissiana* Damplands;
FCT5 – Mixed shrub Damplands;
FCT8 – Herb rich shrubland in clay pans;
FCT10a – Shrubland on dry clay flats;
FCTS2 – Northern *Pericalymma ellipticum* Dense Low Shrublands;
FCT21c – Low-lying *Banksia attenuata* Woodlands or Shrublands; and
FCT23a – Central *Banksia attenuata – Banksia menziesii* Woodlands.

3. METHOD

As the remnant vegetation occurred around the perimeter of the site (see Figure 1) the perimeter firebreaks were driven to the areas of remnant vegetation. As a Level 2 vegetation survey was required temporary 10m x 10m quadrats were recorded. To be able to relocate these same quadrats in spring a GPS (WGS84) was recorded at the northwest corner and a shrub where the reading was taken was flagged with red tape. The areas of remnant bushland were walked to record opportunistic species as well as to search for Threatened and Priority Flora. The vegetation at the site is described using the vegetation classification of Muir (1977) as described in Table 4. Plants unknown in the field were collected, pressed and identified using the collections at the Western Australian Herbarium.

Table 4 Vegetation Classification (from Muir, 1977)

LIFE FORM / HEIGHT CLASS	Canopy Cover			
	DENSE 70 % - 100%	MID DENSE 30% - 70%	SPARSE 10% - 30%	VERY SPARSE 2% - 10%
Trees > 30 m	Dense Tall Forest	Tall Forest	Tall Woodland	Open Tall Woodland
Trees 15 – 30 m	Dense Forest	Forest	Woodland	Open Woodland
Trees 5 – 15 m	Dense Low Forest A	Low Forest A	Low Woodland A	Open Low Woodland A
Trees < 5 m	Dense Low Forest B	Low Forest B	Low Woodland B	Open Low Woodland B
Mallee (tree form)	Dense Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Mallee (shrub form)	Dense Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs > 2 m	Dense Thicket	Thicket	Scrub	Open Scrub
Shrubs 1.5 – 2 m	Dense Heath A	Heath A	Low Scrub A	Open Low Scrub A
Shrubs 1 - 1.5 m	Dense Heath B	Heath B	Low Scrub B	Open Low Scrub B
Shrubs 0.5 – 1 m	Dense Low Heath C	Low Heath C	Dwarf Scrub C	Open Dwarf Scrub C
Shrubs 0 - 0.5 m	Dense Low Heath D	Low Heath D	Dwarf Scrub D	Open Dwarf Scrub D

Table 4 cont.

LIFE FORM / HEIGHT CLASS	Canopy Cover			
	DENSE 70 % - 100%	**MID DENSE 30% - 70%**	**SPARSE 10% - 30%**	**VERY SPARSE 2% - 10%**
Mat plants	Dense Mat Plants	Mat Plants	Open Mat Plants	Very Open Mat Plants
Hummock grass	Dense Hummock Grass	Mid-Dense Hummock Grass	Hummock Grass	Open Hummock Grass
Bunch grass > 0.5 m	Dense Tall Grass	Tall Grass	Open Tall Grass	Very Open Tall Grass
Bunch grass < 0.5 m	Dense Low Grass	Low Grass	Open Low Grass	Very Open Low Grass
Herbaceous spp.	Dense Herbs	Herbs	Open Herbs	Very Open Herbs
Sedges > 0.5 m	Dense Tall Sedges	Tall Sedges	Open Tall Sedges	Very Open Tall Sedges
Sedges < 0.5 m	Dense Low Sedges	Low Sedges	Open Low Sedges	Very Open Low Sedges
Ferns	Dense Ferns	Ferns	Open Ferns	Very Open Ferns
Mosses, liverworts	Dense Mosses	Mosses	Open Mosses	Very Open Mosses

4. RESULTS

Field work was undertaken on 16th May 2013 when 8 quadrats were established and a follow up spring survey was undertaken on 22nd October 2013. The gas pipeline traversed the site approximately E to W. In the following descriptions note that * indicates the plant is a weed.

4.1 Vegetation

The whole of the survey site was classified as wetland. Detailed species lists for each of the quadrats listed under the vegetation units is provided in Appendix B and mapped in Appendix C.

Low Forest B of *Melaleuca preissiana* over Dense Tall Sedges of *Dielsia stenostachya* and *Lepidosperma longitudinale*. This was represented by quadrat AN04 and mapped as DS.

Low Woodland B of *Melaleuca preissiana, Corymbia calophylla, Nuytsia floribunda and Allocasuarina fraseriana* over Open Scrub of *Kunzea glabrescens* over Heath A of *Regelia ciliata* over Open Dwarf Scrub D of mixed taxa over Very Open Tall Sedges of *Dasypogon bromeliifolius* and *Phlebocarya ciliata.* This was represented by quadrat AN07 and mapped as MR.

Low Woodland B of *Melaleuca preissiana* over Thicket of *Melaleuca viminea* over Dense Tall Sedges of *Lepidosperma longitudinale*. This was represented by quadrat AN02 and mapped as Mv.

Open Low Woodland B of *Banksia attenuata* and *Melaleuca preissiana* over Thicket of *Kunzea glabrescens* over Open Low Scrub A of *Regelia ciliata* over Tall Sedges of *Dasypogon bromeliifolius*. This was represented by quadrat AN03 and mapped as Ba.

Open Low Woodland B of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Open to Dense Tall Sedges of *Lepidosperma longitudinale*. This was represented by quadrats AN01, AN06 and AN08 and mapped as Kg. Quadrat AN06 included several non-endemic trees e.g. **Eucalyptus camaldulensis* and **Eucalyptus grandis.* The open areas were dominated by **Eragrostis curvula* and where *Kunzea glabrescens* was dense there was no understorey. AN08 had been cleared but *Kunzea glabrescens* was regrowing quite densely. Currently the area is covered by dense pasture weed species. Several of the trees of *Melaleuca preissiana* at AN08 were of a substantial height and girth and in good condition.

Open Low Woodland B of *Melaleuca preissiana* over Dense Tall Sedges of *Juncus pallidus*. This was an extensive area which appeared to have been cleared in the past and now dominated by *Juncus pallidus.* This was represented by quadrat AN05 and mapped as Jp.

All the vegetation at the site is inferred to be Floristic Community Type 4 – *Melaleuca preissiana* Damplands.

4.2 Vegetation Condition

Bushland has been historically subject to ongoing degradation and is especially susceptible to disturbances arising as a result of indirect impacts from surrounding developments and human activity. Degradation is caused by a wide range of factors, including isolation, edge effects, weed invasion, plant diseases, changes in fire frequency, landscape fragmentation, increased predation on native fauna by feral animals, decrease in species richness and general modification of ecological function. Both lots have historically been used for stock grazing, phases of clearing and weed invasion. These issues affect the biodiversity rating and ecological viability of areas of remnant vegetation and should be assessed in line with conservation values.

Vegetation condition was rated according to the vegetation condition scale used in Keighery (1994). The vegetation condition at the survey site was mainly good to completely degraded with the higher ground vegetation in very good (condition 3) to good (condition 4) condition. There were groups of trees with good cover where the understorey had been completely replaced with weeds. These areas were degraded (condition 5). Where there were no trees and the weeds were dominant the vegetation condition was completely degraded (condition 6). Table 5 explains the vegetation condition rating scale and Table 6 gives the vegetation condition at the site. The vegetation condition of the site is mapped in Appendix C, Map 3.

Table 5. Explanation of Vegetation Condition Rating (Keighery, 1994)

Rating	Description	Explanation
1	Pristine	Pristine or nearly so, no obvious signs of disturbance.
2	Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
3	Very Good	Vegetation structure altered, obvious signs of disturbance.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.
6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

Table 6. Vegetation Condition Recorded from the Site

Vegetation Condition	Quadrat Number
Excellent to very good	AN03, AN07
Very good	AN02 (although becomes degraded close to paddock); AN04 (with small areas in excellent condition)
Very good to good	AN01
Degraded	AN05, AN06, AN08
Degraded to completely degraded	Open areas at AN06
Completely degraded	Paddocks and around infrastructure

4.3 Taxa

A total of 42 vascular plant families, 93 genera and 117 taxa were recorded during both the surveys of which 37 were introduced species. *Banksia menziesii* was only recorded along the boundary fence with Bush Forever Site 342.

4.4 Significant Taxa

A Priority 3 flora, *Jacksonia gracillima*, was recorded from two areas. At AN04 two plants were recorded in fruit in the May survey but were in bud in October and at AN07 one vegetative plant was recorded in May but was just commencing to flower in October. This is a low growing shrub with characteristic pea-shaped flowers. The spring survey confirmed the identity of *Jacksonia gracillima* but no further plants than those listed above were recorded.

In spring a detailed search was undertaken for the threatened and priority flora listed in Table 3. A detailed search was undertaken of all the remnant vegetation including the very damp areas preferred by *Diuris purdei* but no further significant plants were observed.

4.5 Weeds

A total of 37 weeds or non-endemic Australian species were recorded during both surveys. All have been determined as weeds by the Western Australian Herbarium (2013a) and Department of Parks and Wildlife (2013c). There are several ratings allocated to each weed in the Invasive Plant Prioritisation but only three have been selected to include in this report. These are ecological impacts, impact attributes and invasiveness which are shown in Table 7 for each of the non-endemic species recorded. .

Table 7. Ecological Impacts and Invasiveness of recorded weeds

Species	Ecological Impacts		Invasiveness
	Ecological impact L – low impact species M – medium impact species H – high impact species U – unknown impact	Impact attributes 1, 2,3,4, 5, 6, 7, 8, 9, 10 See explanation below table	Rate of dispersal R=rapid, M=moderate, S=slow U = unknown
**Acacia longifolia*	H	1,2,4,6,7,8,9	M
**Acetosella vulgaris*	U		S
**Aira caryophyllea*	U		U
**Arctotheca calendula*	H	8,9	R
**Asparagus asparagoides*	H	6,7,8,9	R
**Briza maxima*	U		R
**Briza minor*	U		R
**Bromus diandrus*	H		R
**Callitriche stagnalis*	H		R

Table 7. cont.

Species	Ecological Impacts		Invasiveness
	Ecological impact L – low impact species M – medium impact species H – high impact species U – unknown impact	Impact attributes 1, 2,3,4, 5, 6, 7, 8, 9, 10 See explanation below table	Rate of dispersal R=rapid, M=moderate, S=slow
**Carpobrotus edulis*	H	8,9	R
**Cicendia filiformis*	L		R
**Conyza bonariensis*	L		M
**Cortaderia selloana*	H	1,6,7,8,9	R
**Cynodon dactylon*	H	9	R
**Disa bracteata*	U		R
**Ehrharta calycina*	H	1,2,6,8,9	R
**Ehrharta longiflora*	H	1,2,6,8,9	R
**Eragrostis curvula*	H		R
**Eucalyptus camaldulensis*	M		S
**Eucalyptus grandis*	Not listed		
**Eucalyptus robusta*	Not listed		
**Euphorbia terracina*	H	8,9	R
**Fumaria capreolata*	H	7,9	R
**Hypochaeris glabra*	H		R
**Isolepis marginatus*	U		U
**Leptospermum laevigatum*	H	1,6,7,8,9	R
**Lolium multiflorum*	H		R
**Lotus subbiflorus*	U		R
**Lysimachia arvensis*	U		R
**Moraea flaccida*	H	8,9	R
**Phytolacca octandra*	U		M
**Romulea rosea*	U		R
***Solanum nigrum*	M		R
**Ursinia anthemoides*	U	increasing	R
**Vulpia bromoides*	H		R
**Wahlenbergia capensis*	U		R
**Zantedeschia aethiopica*	H	6,7,8,9,10	R

Impact Attributes: 1 - changed fire regime; 2 - changed nutrient conditions; 3 - changed hydrological patterns; 4 - changed soil erosion patterns; 5 - changed geomorphological processes; 6 - changed biomass distribution; 7 - changed light distribution; 8 - loss of biodiversity; 9 - substantially reduces regeneration opportunities of native plants; 10 - allelopathic effects. Increasing means that the weed is increasing its distribution from original known areas.

Three of the weeds are listed by the Department of Agriculture and Food (2012) as declared plants. These are Narrow-leaf Cotton Bush (**Gomphocarpus fruticosus*) One-leaf Cape Tulip (**Moraea flaccida*) and Arum Lily (**Zantedeschia aethiopica*) and should be prioritised for removal.

5. DISCUSSION

Lots 101 and 200 Anstey Road, Forrestdale were mainly cleared of remnant vegetation but with some remaining along the perimeter with Bush Forever Site 342 and along the Anstey Road boundary of Lot 200. Six different vegetation units were described for the survey site. These are inferred to be representative of Floristic Community Type 4, *Melaleuca preissiana* Damplands.

Large Eastern Australian trees **Eucalyptus robusta*, **Eucalyptus camaldulensis* and **Eucalyptus grandis* have been planted around the Anstey Road boundary of the properties and it would appear some within what was originally a cleared area on Lot101. This is now a Dense Thicket where quadrat AN06 was located. The north western side of Lot 101 has a large number of juvenile *Kunzea glabrescens* growing in an area that had previously been grazed and possibly cleared.

The remnant vegetation varied from a condition between excellent and very good to degraded. The surrounding paddocks and around the infrastructure was in a completely degraded condition.

One Priority 3 Flora, *Jacksonia gracillima*, was recorded from two areas. No additional significant flora were recorded during the October survey.

A total of 42 vascular plant families, 93 genera and 117 taxa were recorded during the survey of which 37 were introduced species

6. REFERENCES

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

Biggs, E.R. and Wilde, S.A. (1980). *Geology, Mineral Resources and Hydrology of the Darling System, Western Australia*. Department of Conservation and Environment, Perth, Western Australia

Churchward, H.M. and McArthur, W.M. (1980). *Landform and Soils of the Darling System* In *Atlas of Natural Resources, Darling System, Western Australia*. Department of Conservation and Environment, Perth, Western Australia

Department of Agriculture and Food (2012). *Declared Plants in Western Australia*. Department of Agriculture and Food Western Australia

Department of Parks and Wildlife (2013a). *Declared Rare and Priority List for Western Australia.* Published list by the Department of Conservation and Land Management, Western Australia

Department of Parks and Wildlife (2013b). *List of Threatened Ecological Communities on the Department of Environment and Conservation Threatened Ecological Communities (TEC) Database endorsed by the Minister for the Environment*. http://www.naturebase.net/plants_animals/watscu/pdf/tec/endorsed_tec_list_jan04.pdf

Department of Parks and Wildlife (2013c). *Invasive Plant Prioritisation Process for Department of Environment and Conservation*. http://www.dec.wa.gov.au/content/view/6295/2275/1/1/

Department of Sustainability, Environment. Water. Populations and Communities (2013). *EPBC Act List of Threatened Flora.* http://www.deh.gov.au/

Environmental Protection Authority (2004). *Guidance for the Assessment of Environmental Factors, Terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia. No. 51.* EPA, Perth

Gibson, N., Keighery, B.J., Keighery, G.J., Burbidge, A.H. and Lyons, M.N. (1994). *A Floristic Survey of the southern Swan Coastal Plain.* Unpublished report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.)

Government of Western Australia (2000). *Bush Forever*. Department of Environmental Protection, WA

Heddle, E.M., Loneragan, O.W. and Havell, J.J. (1980). *Vegetation of the Darling System* In *Atlas of Natural Resources, Darling System, Western Australia*. Department of Conservation and Environment, Perth, Western Australia

Hussey, B.M.J., Keighery, G.J., Cousens, R.D., Dodd, J. and Lloyd, S.G. (1997). *Western Weeds – A guide to the weeds of Western Australia.* Plant Protection Society of Western Australia

Keighery, B.J. (1994). *Bushland Plant Survey: a Guide to Plant Community Surveys for the Community.* Wildflower Society of Western Australia (Inc.) Nedlands, Western Australia

Mitchell, D., Williams, K. and Desmond, A. (2002). *Swan Coastal Plain 2 (SWA2 – Swan Coastal Plain subregion)* In *A Biodiversity Audit of Western Australia's 53 Biogeographical subregions.* Department of Conservation and Land Management

Muir, B.G. (1977). *Biological Survey of the Western Australian Wheatbelt. Part II: Vegetation and habitat of Bendering Reserve*. Records of the Western Australian Museum, Supplement No. 3

Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2002). *Native Vegetation in Western Australia Extent, Type and Status. Resource Management Technical Report 249*. Department of Agriculture, Government of Western Australia

Thackway, R. and Cresswell I. D. (1995). *An Interim Biogeographical Regionalisation for Australia: a Framework for Setting Priorities in the National Reserves System Cooperative Program.* Australian Nature Conservation Agency, Canberra, ACT

Western Australian Herbarium (2013). *Florabase*. Department of Environment and Conservation. http://www.calm.wa.gov.au/science/florabase.html

APPENDIX A

Taxa Listed Under Vascular Plant Family

LEGEND

ABBREVIATION	MEANING
sp.	Species, used where the plant is vegetative or too immature for positive identification
subsp.	subspecies
var.	variety
forma	form
*	Weed or non-endemic Australian species

VASCULAR PLANT FAMILY	TAXON
Aizoaceae	
	**Carpobrotus edulis*
Anarthriaceae	
	Lyginia imberbis
Apiaceae	
	Homalosciadium homalocarpum
Araceae	
	**Zantedeschia aethiopica*
Araliaceae	
	Trachymene pilosa
Asparagaceae	
	**Asparagus asparagoides*
	Chamaescilla corymbosa
	Dichopogon preissii
	Laxmannia ramosa
	Lomandra hermaphrodita
	Lomandra preissii
	Lomandra sericea
	Sowerbaea laxiflora
	Thysanotus manglesianus
Asteraceae	
	**Arctotheca calendula*
	**Conyza bonariensis*
	**Hypochaeris glabra*
	Podolepis gracilis
	Senecio pinnatifolius var. *latilobus*
	**Ursinia anthemoides*
Campanulaceae	
	**Wahlenbergia capensis*
Casuarinaceae	
	Allocasuarina fraseriana
Centrolepidaceae	
	Aphelia cyperoides
	Centrolepis aristata
	Centrolepis glabra
Colchicaceae	
	Burchardia congesta
Cyperaceae	
	Baumea preissii
	Gahnia trifida
	**Isolepis marginata*
	Isolepis oldfieldiana
	Lepidosperma longitudinale
	Schoenus odontocarpus
	Tetraria octandra
Dasypogonaceae	
	Dasypogon bromeliifolius
Dilleniaceae	
	Hibbertia subvaginata

VASCULAR PLANT FAMILY	TAXON
Droseraceae	
	Drosera erythrorhiza
	Drosera gigantea
	Drosera glanduligera
	Drosera menziesii subsp. *menziesii*
	Drosera menziesii subsp. *penicillaris*
Ericaceae	
	Leucopogon sprengelioides
Euphorbiaceae	
	**Euphorbia terracina*
Fabaceae	
	**Acacia longifolia*
	Acacia pulchella var. *pulchella*
	Acacia willdenowiana
	Bossiaea eriocarpa
	Gastrolobium capitatum
	Gompholobium tomentosum
	Jacksonia gracillima
	Jacksonia sternbergiana
	Kennedia prostrata
	Latrobea tenella
	**Lotus subbiflorus*
Gentianaceae	
	**Cicendia filiformis*
Goodeniaceae	
	Goodenia coerulea
Haemodoraceae	
	Anigozanthos manglesii
	Conostylis aurea
	Haemodorum paniculatum
	Phlebocarya ciliata
Hemerocallidaceae	
	Corynotheca micrantha
	Dianella revoluta
Iridaceae	
	**Moraea flaccida*
	Patersonia occidentalis
	**Romulea rosea*
Juncaceae	
	Juncus pallidus
Lauraceae	
	Cassytha aurea var. *aurea*
	Cassytha racemosa forma *racemosa*
Loganiaceae	
	Phyllangium paradoxum
Loranthaceae	
	Nuytsia floribunda

VASCULAR PLANT FAMILY	TAXON
Myrtaceae	
	Astartea scoparia
	Corymbia calophylla
	**Eucalyptus camaldulensis*
	**Eucalyptus grandis*
	Eucalyptus todtiana
	**Eucalyptus robusta*
	Kunzea glabrescens
	**Leptospermum laevigatum*
	Melaleuca preissiana
	Melaleuca rhaphiophylla
	Melaleuca viminea
	Regelia ciliata
	Verticordia densiflora
Orchidaceae	
	Caladenia flava
	**Disa bracteata*
	Pterostylis pyramidalis
	Pterostylis vittata
Papaveraceae	
	**Fumaria capreolata*
Phyllanthaceae	
	Poranthera microphylla
Phytolaccaceae	
	**Phytolacca octandra*
Plantaginaceae	
	**Callitriche stagnalis*
Poaceae	
	**Aira caryophyllea*
	Austrostipa compressa
	**Briza maxima*
	**Briza minor*
	**Bromus diandrus*
	**Cortaderia selloana*
	**Cynodon dactylon*
	**Ehrharta calycina*
	**Ehrharta longiflora*
	**Eragrostis curvula*
	**Lolium multiflorum*
	**Vulpia bromoides*
Polygonaceae	
	**Acetosella vulgaris*
Primulaceae	
	**Lysimachia arvensis*
Proteaceae	
	Banksia attenuata
	Banksia dallanneyi var. *dallanneyi*

VASCULAR PLANT FAMILY	TAXON
Restionaceae	
	Desmocladus fasciculatus
	Desmocladus flexuosus
	Dielsia stenostachya
	Hypolaena exsulca
	Meeboldina cana
	Meeboldina coangustata
Rutaceae	
	Philotheca spicata
Solanaceae	
	**Solanum nigrum*
Stylidiaceae	
	Stylidium guttatum
Xanthorrhoeaceae	
	Xanthorrhoea brunonis
	Xanthorrhoea preissii

APPENDIX B

Quadrat Data

Additional species recorded during October 2013 survey are in bold

LEGEND

ABBREVIATION	MEANING
sp.	Species, used where the plant is vegetative or too immature for positive identification
subsp.	subspecies
var.	variety
forma	form
*	Weed or non-endemic Australian species

QUADRAT AN01

GPS (WGS84): 399838E; 6443402N
Soil: Grey sandy loam
Litter: Branches 60%; Leaves 25%
Vegetation Description: Open Low Woodland B of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Open to Dense Tall Sedges of *Lepidosperma longitudinale*
Vegetation Condition: 3-4 - very good to good
Notes: Several Arum lilies in the area. Good moss cover on ground. Beside the cleared area there were more plants of *Astartea scoparia, Regelia ciliata* and *Lepidosperma longitudinale*. Couch was also common in the edge. There were several *Gahnia trifida* clumps between this quadrat and quadrat AN02.

SPECIES	HEIGHT (CM)	% COVER
***Acetosella vulgaris**	10	<1
Acacia pulchella var. *pulchella*	50	<1
***Briza maxima**	60	1
***Briza minor**	10	<1
Burchardia congesta	70	<1
***Caladenia flava**	15	<1
***Centrolepis aristata**	15	<1
***Cicendia filiformis**	15	<1
Dasypogon bromeliifolius	50	<1
Desmocladus flexuosus	40	<1
**Ehrharta calycina*	60	<1
***Homalosciadium homalocarpum**	15	<1
***Hypochaeris glabra**	25	<1
***Isolepis marginata**	15	2

SPECIES	HEIGHT (CM)	% COVER
Jacksonia sternbergiana	60	<1
Kennedia prostrata	twiner	<1
Kunzea glabrescens	400	85
Lepidosperma longitudinale	70	15
****Lotus subbiflorus***	25	2
Lyginia imberbis	50	<1
Meeboldina coangustata	60	<1
Melaleuca preissiana	400	4
Phyllangium paradoxum	20	15
Pterostylis vittata	25	<1
Regelia ciliata	60	<1
**Solanum nigrum*	30	<1
Stylidium guttatum	15	<1
Thysanotus manglesianus	twiner	<1
Trachymene pilosa	20	<1
Zantedeschia aethiopicum	30	1
**Asparagus asparagoides*	opportunistic	
Astartea scoparia	opportunistic	
Baumea preissii	opportunistic	
Cassytha aurea var. *aurea*	opportunistic	
Centrolepis glabra	opportunistic	
Chamaescilla corymbosa	opportunistic	
Desmocladus fasciculatus	opportunistic	
Drosera glanduligera	opportunistic	
Gahnia trifida	opportunistic	
Hypolaena exsulca	opportunistic	
Juncus pallidus	opportunistic	
Lomandra preissii	opportunistic	
****Moraea flaccida***	opportunistic	
Patersonia occidentalis	opportunistic	
**Phytolacca octandra*	opportunistic	
Sowerbaea laxiflora	opportunistic	
****Ursinia anthemoides***	opportunistic	
****Vulpia bromoides***	opportunistic	

QUADRAT AN02

GPS (WGS84): 399875E; 6443460N
Soil: Grey sandy loam
Litter: Branches 5%; Leaves 10%
Vegetation Description: Low Woodland B of *Melaleuca preissiana* over Thicket of *Melaleuca viminea* over Dense Tall Sedges of *Lepidosperma longitudinale*
Vegetation Condition: 3 (very good) grading to 5 (degraded) on the edge
Notes: Large number of pig diggings observed under the shrubs in April. Closer to the cleared area there were dense shrubs of *Regelia ciliata*, where the *Melaleuca viminea* cover was not as dense. Area very wet in October

SPECIES	HEIGHT (CM)	% COVER
Acacia pulchella var. *pulchella*	50	<1
Aphelia cyperoides	10	<1
Briza maxima	60	<1
****Briza minor***	30	10
****Cicendia filiformis***	10	<1
Desmocladus fasciculatus	60	<1
****Disa bracteata***	20	<1
Drosera gigantea	50	3
Drosera menziesii subsp. ***menziesii***	twiner	<1
Drosera menziesii subsp. ***penicillaris***	10	<1
Goodenia coerulea	twiner	<1
Haemodorum paniculatum	80	<1
Lepidosperma longitudinale	70	85
****Lotus subbiflorus***	20	5

SPECIES	HEIGHT (CM)	% COVER
Melaleuca preissiana	400	20
Melaleuca rhaphiophylla	175	<1
Melaleuca viminea	300	60
Schoenus odontocarpus	15	<1
Stylidium guttatum	25	1
Thysanotus manglesianus	twiner	<1
****Callitriche stagnalis***	opportunistic	
Cassytha racemosa var. *racemosa*	opportunistic	
Centrolepis aristata	opportunistic	
**Conyza bonariensis*	opportunistic	
**Cortaderia selloana*	opportunistic	
Desmocladus flexuosus	opportunistic	
Eragrostis curvula	opportunistic	
Gahnia trifida	opportunistic	
**Hypochaeris glabra*	opportunistic	
Isolepis oldfieldiana	opportunistic	
Juncus pallidus	opportunistic	
Latrobea tenella	opportunistic	
Lomandra preissii	opportunistic	
Meeboldina cana	opportunistic	
Meeboldina coangustata	opportunistic	
Patersonia occidentalis	opportunistic	
Podolepis gracilis	opportunistic	
Regelia ciliata	opportunistic	
**Solanum nigrum*	opportunistic	
Verticordia densiflora	opportunistic	

QUADRAT AN03

GPS (WGS84): 399994E; 6443585N
Soil: Grey sand
Litter: Branches 40%; Leaves 45%
Vegetation Description: Open Low Woodland B of *Banksia attenuata* and *Melaleuca preissiana* over Thicket of *Kunzea glabrescens* over Open Low Scrub A of *Regelia ciliata* over Tall Sedges of *Dasypogon bromeliifolius*.
Vegetation Condition: 2-3 (excellent to very good)
Notes: Several *Banksia attenuata* dead through the area. Several of the *Dasypogon bromeliifolius* close to the fire break appear to be dead or dying

SPECIES	HEIGHT (CM)	% COVER
Acacia pulchella var. *pulchella*	70	1
Banksia attenuata	500	4
Bossiaea eriocarpa	30	1
Caladenia flava	15	<1
Dasypogon bromeliifolius	60	50
Desmocladus fasciculatus	15	<1
Drosera erythrorhiza	2	3
Gompholobium tomentosum	40	<1
Kennedia prostrata	twiner	<1
Kunzea glabrescens	600	70
Lepidosperma longitudinale	60	<1
Leucopogon sprengelioides	30	<1
Lomandra sericea	60	<1
Melaleuca preissiana	450	4

Pterostylis pyramidalis	5	<1
SPECIES	**HEIGHT (CM)**	**% COVER**
Regelia ciliata	250	10
Acacia longifolia	opportunistic	
Allocasuarina fraseriana	opportunistic	
Austrostipa compressa	opportunistic	
Chamaescilla corymbosa	opportunistic	
Eucalyptus todtiana	opportunistic	
Homalosciadium homalocarpum	opportunistic	
****Isolepis marginata***	opportunistic	
Jacksonia sternbergiana	opportunistic	
Lomandra preissii	opportunistic	
****Wahlenbergia capensis***	opportunistic	
Xanthorrhoea brunonis	opportunistic	
Xanthorrhoea preissii	opportunistic	

QUADRAT AN04

GPS (WGS84): 400007E; 6443541N
Soil: Grey sand
Litter: Bark 5%; Logs 2%; Branches 5%; Leaves 15%
Vegetation Description: Low Forest B of *Melaleuca preissiana* over Dense Tall Sedges of *Dielsia stenostachya* and *Lepidosperma longitudinale*
Vegetation Condition: (2)-3, very good with only a few sections in excellent condition
Notes: 2 shrubs of *Jacksonia gracillima* recorded. Area wet in October

SPECIES	HEIGHT (CM)	% COVER
Astartea scoparia	100	<1
**Briza maxima*	70	2
Briza minor	25	<1
Bromus diandrus	80	2
Dielsia stenostachya	70	60
Ehrharta calycina	90	5
Ehrharta longiflora	70	10
**Hypochaeris glabra*	2	2
Lepidosperma longitudinale	70	20
Lotus subbiflorus	15	5
Melaleuca preissiana	400	60
Regelia ciliata	50	<1
**Solanum nigrum*	50	<1
Thysanotus manglesianus	twiner	<1
Zantedeschia aethiopica	60	3

SPECIES	HEIGHT (CM)	% COVER
Eragrostis curvula	opportunistic	
Jacksonia gracillima	opportunistic	
Kunzea glabrescens	opportunistic	
Meeboldina coangustata	opportunistic	
Patersonia occidentalis	opportunistic	
Xanthorrhoea brunonis	opportunistic	

QUADRAT AN05

GPS (WGS84): 400012E; 6443484N
Soil: Grey sand
Litter: Leaves 20%
Vegetation Description: Open Low Woodland B of *Melaleuca preissiana* over Dense Tall Sedges of *Juncus pallidus*
Vegetation Condition: 5 - degraded
Notes: Several plants also of *Kunzea glabrescens* through the unit. There are open bare patches scattered through

SPECIES	HEIGHT (CM)	% COVER
Arctotheca calendula	35	1
**Cynodon dactylon*	70	10
Drosera glanduligera	5	<1
****Ehrharta longiflora***	60	15
Eragrostis curvula	80	5
**Hypochaeris glabra*	2	5
Juncus pallidus	120	85
**Leptospermum laevigatum*	30	<1
****Lolium multiflorum***	50	2
****Lotus subbiflorus***	40	5
Melaleuca preissiana	400	5
**Romulea rosea*	25	25
****Vulpia bromoides***	30	15
****Carpobrotus edulis***	opportunistic	
****Disa bracteata***	opportunistic	

SPECIES	HEIGHT (CM)	% COVER
Jacksonia sternbergiana	opportunistic	
Kunzea glabrescens	opportunistic	

QUADRAT AN06

GPS (WGS84): 400164E; 6443312N
Soil: Grey sand
Litter: Branches 15%; leaves 30%
Vegetation Description: Dense Thicket of *Kunzea glabrescens* with emergent tall trees of **Eucalyptus grandis* and **Eucalyptus camaldulensis* over bare ground or dense weeds
Vegetation Condition: 5 - degraded
Notes: Dense areas of *Kunzea glabrescens* with open patches dominated by **Eragrostis curvula*. Under dense *Kunzea glabrescens* the ground was bare

SPECIES	HEIGHT (CM)	% COVER
Acacia pulchella var. ***pulchella***	20	<1
****Disa bracteata***	35	<1
Drosera glanduligera	5	2
****Ehrharta longiflora***	60	20
**Eragrostis curvula*	90	20-100
**Hypochaeris glabra*	2	20
Kunzea glabrescens	300	60
****Lotus subbiflorus***	25	1
**Romulea rosea*	25	40
****Ursinia anthemoides***	40	3
Acacia longiflora	opportunistic	
Corynotheca micrantha	opportunistic	
**Cynodon dactylon*	opportunistic	
**Eucalyptus camaldulensis*	opportunistic	
**Eucalyptus grandis*	opportunistic	
**Eucalyptus robusta*	opportunistic	
Gompholobium tomentosum	opportunistic	

QUADRAT AN07

GPS (WGS84): 400099E; 6443215N
Soil: Grey sand
Litter: Branches 5%; Leaves 35%
Vegetation Description: Low Woodland B of *Melaleuca preissiana, Corymbia calophylla, Nuytsia floribunda* and *Allocasuarina fraseriana* over Open Scrub of *Kunzea glabrescens* over Heath A of *Regelia ciliata* over Open Dwarf Scrub D of mixed taxa over Very Open Tall Sedges of *Dasypogon bromeliifolius* and *Phlebocarya ciliata*
Vegetation Condition: 2-3 excellent to very good
Notes: *Jacksonia gracillima* shrub near NW peg. Most diverse of the vegetation units at the survey site

SPECIES	HEIGHT (CM)	% COVER
Acacia pulchella var. *pulchella*	70	1
****Aira caryophyllea***	10	<1
Anigozanthos manglesii	30	5
****Asparagus asparagoides***	twiner	<1
Banksia dallanneyi subsp. *dallanneyi*	35	3
****Briza maxima***	70	2
****Briza minor***	20	3
Burchardia congesta	60	2
Chamaescilla corymbosa	30	15
Conostylis aurea	30	1
Corymbia calophylla	350	2
Dasypogon bromeliifolius	5	10
Desmocladus fasciculatus	50	1
Dianella revoluta	50	1
Dichopogon preissii	30	<1
Drosera erythrorhiza	2	3

SPECIES	HEIGHT (CM)	% COVER
Ehrharta calycina	80	5
**Ehrharta longiflora*	70	2
Gompholobium tomentosum	50	<1
Hibbertia subvaginata	50	1
Hypolaena exsulca	30	<1
Jacksonia sternbergiana	200	1
Kennedia prostrata	twiner	<1
Kunzea glabrescens	300	5
Laxmannia ramosa	10	1
Lomandra preissii	70	<1
****Lotus subbiflorus***	15	1
****Lysimachia arvensis***	15	1
Melaleuca preissiana	450	10
Patersonia occidentalis	50	1
Phlebocarya ciliata	50	3
Poranthera microphylla	10	<1
Regelia ciliata	175	60
Senecio pinnatifolius* var. *latilobus	20	<1
Sowerbaea laxiflora	50	5
Tetraria octandra	80	<1
Thysanotus manglesianus	twiner	<1
****Wahlenbergia capensis***	30	10
Xanthorrhoea brunonis	120	1
Zantedeschia aethiopicum	30	<1
Acacia willdenowiana	opportunistic	
Allocasuarina fraseriana	opportunistic	
Eucalyptus camaldulensis	opportunistic	
Eucalyptus todtiana	opportunistic	
**Euphorbia terracina*	opportunistic	
**Fumaria capreolata*	opportunistic	
Gastrolobium capitatum	opportunistic	
Jacksonia gracillima	opportunistic	
Lomandra hermaphrodita	opportunistic	
Nuytsia floribunda	opportunistic	
Philotheca spicata	opportunistic	
**Solanum nigrum*	opportunistic	
Xanthorrhoea preissii	opportunistic	

QUADRAT AN08

GPS (WGS84): 400085E; 6443607N
Soil: Grey sandy loam
Litter: Leaves 5%
Vegetation Description: Open Low Woodland B of *Melaleuca preissiana* with large numbers of regrowing *Kunzea glabrescens*
Vegetation Condition: 5-6 degraded to completely degraded
Notes: Several of the *Melaleuca preissiana* have a good height and girth and are in very good condition. Should be retained where possible

SPECIES	HEIGHT (CM)	% COVER
**Arctotheca calendula*	10	30
**Carpobrotus edulis*	10	1
****Ehrharta longiflora***	60	80
****Hypochaeris glabra***	30	15
Kunzea glabrescens	150	30
**Leptospermum laevigatum*	250	5
****Lolium multiflorum***	80	<1
Melaleuca preissiana	600	5 up to 20
****Wahlenbergia capensis***	80	1
Austrostipa compressa	opportunistic	
**Eragrostis curvula*	opportunistic	
Eucalyptus camaldulensis	opportunistic	
Eucalyptus grandis	opportunistic	
Regelia ciliata	opportunistic	

APPENDIX C

Maps

1. Approximate location of quadrats
2. Vegetation units
3. Vegetation condition

Abbreviations used in maps

VEGETATION UNITS	
Abbreviation	**Description**
Ds	Low Forest B of *Melaleuca preissiana* over Dense Tall Sedges of *Dielsia stenostachya* and *Lepidosperma longitudinale*
MR	Low Woodland B of *Melaleuca preissiana, Corymbia calophylla, Nuytsia floribunda and Allocasuarina fraseriana* over Open Scrub of *Kunzea glabrescens* over Heath A of *Regelia ciliata* over Open Dwarf Scrub D of mixed taxa over Very Open Tall Sedges of *Dasypogon bromeliifolius* and *Phlebocarya ciliata*
Mv	Low Woodland B of *Melaleuca preissiana* over Thicket of *Melaleuca viminea* over Dense Tall Sedges of *Lepidosperma longitudinale*
Ba	Open Low Woodland B of *Banksia attenuata* and *Melaleuca preissiana* over Thicket of *Kunzea glabrescens* over Open Low Scrub A of *Regelia ciliata* over Tall Sedges of *Dasypogon bromeliifoliu*.
Kg	Open Low Woodland B of *Melaleuca preissiana* over Dense Thicket of *Kunzea glabrescens* over Open to Dense Tall Sedges of *Lepidosperma longitudinale*
Jp	Open Low Woodland B of *Melaleuca preissiana* over Dense Tall Sedges of *Juncus pallidus*
VEGETATION CONDITION	
Abbreviation	**Description**
2-3	Excellent to very good
3	Very good
3-4	Very good to good
5	Degraded
5-6	Degraded to completely degraded
6	Completely degraded

Map 1: Approximate location of quadrats

Map 2: Vegetation units

Map 3: Vegetation condition

COTERRA
ENVIRONMENT

Level 3, 25 Prowse Street
West Perth WA 6005

T (08) 9381 5513

www.coterra.com.au
info@coterra.com.au