COTERRA ENVIRONMENT

Native Vegetation Clearing Permit Application

Lot 4800 Moseley Drive, The Vines

Revision 0 October 2022

CALIBRE | COMMITMENT | COLLABORATION

This report was prepared by: Coterra Pty Ltd trading as COTERRA ENVIRONMENT
ABN: ABN: 92 143 411 456
Our Ref: DBAELL07
Author(s): K. Watts
Reviewer: K. Choo
Report Version: Revision 0
Date: October 2022

This report was prepared for:

Catholic Archdiocese of Perth
C/- Barnao Property
3/448 Roberts Road
Subiaco WA 6008

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1 Introduction

1.1 Background

The Catholic Archbishop of Perth purchased Lot 4800 Moseley Drive, The Vines (the site) for the purpose of constructing a private primary school on the site. The lot extends over an area of approximately 4 hectares (ha) and was identified for this purpose in the Outline Development Plan and also the subdivision applications which were submitted and approved for the site.

Clearing proposed for the site was brought forward to address concerns raised by neighbouring residents and the City of Swan (CoS) in relation to bushfire hazard and risk to surrounding properties.

1.1.1 Previous NVCP and DA Approvals

To enable the clearing of identified areas onsite to be undertaken to address the concerns noted above a Native Vegetation Clearing Permit (NVCP) application and CoS Development Approval (DA) application were submitted to the Department of Water and Environmental Regulation (DWER) and the CoS respectively in 2017.

The DA application was approved in February 2018 (Appendix 1) and the NVCP application (DWER Ref: CPS 7538-1) was approved in August 2019 (Appendix 2).

1.1.2 Negotiated Planning Solution

The approval of the NVCP referenced the previous Negotiated Planning Solution (NPS) for Bush Forever Site 23 which was relevant to the site. This NPS resulted in transferring approximately 27 ha of the original landholdings with significant environmental values to the crown and being reserved for conservation (as Bush Forever Site 23) to enable the surrounding urban development.

1.1.3 2019 Vegetation Clearing Program

The clearing of 0.73 ha (Figure 1) of native vegetation at the site was undertaken in November 2019 and done in accordance with the NVCP and DA approvals. A compliance report detailing the actions undertaken in relation to the permit requirements was submitted to DWER in January 2020.

1.1.4 Requirement for further Vegetation Maintenance/Clearing

The DA, which remains a valid and legally enforceable document, requires that the cleared areas on the lot shall be maintained in a low fuel state to the satisfaction of the City (Condition 4). In order to comply with this requirement additional vegetation maintenance/clearing works are required within the previously cleared areas to manage the regrowth.

This NVCP application has been prepared to enable these vegetation maintenance/clearing works to proceed.

1.2 City of Swan Consultation

Liaison has been undertaken with the CoS in relation to the required clearing to confirm their support and to identify if a potential NVCP exemption may exist. The City has advised that they are supportive of the vegetation maintenance/clearing proposed in accordance with the DA requirements and have identified that a possible NVCP exemption could exist related to the City's Fire Hazard Reduction Notice (Appendix 3) in relation to the requirement for maintenance of vegetation at or below 8 tonnes per hectare for land parcels with an area greater than 25,000m^2.

The key contacts at the CoS who have been involved with this consultation include:

- Magnus Ohman, Coordinator of Fire and Emergency Management
- Richard Daniel, Acting Coordinator of Fire and Emergency Management
- Rebecca Lodge, Senior Planning Officer

1.3 DWER Consultation

Consultation in relation to the proposed vegetation maintenance/clearing has been undertaken with DWER via Mat Gannaway, Manager, Native Vegetation Regulation. The DWER advice notes that if the proposed clearing is in accordance with the City's Fire Hazard Reduction Notice, then the exemption under Schedule 6 may apply but it is ultimately up to the person doing the clearing to determine whether a valid exemption applies.

In order to avoid doubt and ensure that the vegetation maintenance/clearing works have the necessary approvals in place, this NVCP application has been prepared and submitted to DWER.

2 Site Description

2.1 Topography and Soils

The site is generally flat with an elevation of 33 to 34mAHD. The north eastern corner rises to an elevation of 37mAHD (DWER, 2022).

Regional scale mapping indicated that soils at the site generally comprise Peaty Clays which are described as dark grey and black with variably sand content (Gozzard, 1986).

2.2 Hydrology

2.2.1 Groundwater

The maximum water table occurs at approximately 32mAHD in this location (DWER, 2022). The general groundwater flow direction is easterly.

2.2.2 Wetlands

The Geomorphic Wetlands mapping indicated that the site comprises a palusplain (seasonally waterlogged flat) wetland (UFI 15065) which has been assigned a Conservation management category (Landgate, 2022). It is noted that the wetland mapping in this location is not current as much of the mapped wetland extent now comprises housing or has been cleared. The wetland mapping is shown on Figure 2.

2.2.2.1 Former Negotiated Planning Solution

As noted in Section 1.1.2, a Bush Forever NPS outcome associated with Bush Forever Site 23 was agreed for this site. This NPS allowed the eastern part of the original site, containing the better quality vegetation and preserved wetlands (approximately 40% of the Conservation Category Wetland) to be reserved within Bush Forever Site No. 23.

Approval for development of the remainder of the landholding, including mapped wetland areas, was granted by the CoS and the Western Australian Planning Commission (WAPC) with the support of the Environmental Protection Authority (EPA) and (then) Western Australian Department of Environment.

2.3 Vegetation, Flora and Fauna

2.3.1 Vegetation Complex

The site is mapped within the pre-development extent of the following complexes (Heddle et al., 1980):

- Southern River Complex: Open Woodland of *Corymbia calophylla* (marri) – *Eucalyptus marginata* (jarrah) – Banksia species with fringing Woodland of *Eucalyptus rudis* (flooded gum) – *Melaleuca rhaphiophylla* (swamp paperbark) along creek beds; and
- Bassendean Complex-North: vegetation ranges from a Low Open Forest and Low Open Woodland of Banksia species *Eucalyptus todtiana* (pricklybark) to Low Woodland of Melaleuca species and Sedgelands which occupy the moister sites (Heddle et al., 1980).

Vegetation remaining onsite is within the mapped extent of the Southern River complex (Landgate, 2022).

2.3.2 Flora and Vegetation Survey (Spring 2017)

A vegetation and flora survey of the site was undertaken by Bennett Environmental Consulting in September 2017. The key findings of this survey included:

- There were three distinct areas of remnant vegetation at the site surrounded by degraded areas. The remnant vegetation as well as some of the degraded area were inundated.
- Two vegetation units were recorded from the survey area. These were:
  - Open Forest or Tall Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca rhaphiophylla* with occasional *Melaleuca preissiana* over Sedgeland dominated by *Lepidosperma longitudinale* and *Baumea juncea*; and
  - Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* over Low Shrubland of *Xanthorrhoea preisii* over Sedgeland of *Dielsia stenostachya* over Open Ferns of *Pteridium esculentum*.
- Neither of the vegetation units onsite are threatened or priority ecological communities.
- Vegetation condition was assessed to vary between very good and good.
- A total of 30 vascular plant families, 51 genera and 60 taxa were recorded. None of the species were threatened or priority species.
- Thirty one weeds were recorded of which two, **Gomphocarpus fruticosus* and **Echium plantagineum* are listed as Declared Pest Plants.

A copy of the flora and vegetation survey report is provided in Appendix 4. Vegetation type and condition mapping is presented on Figure 3 and Figure 4.

2.3.3 DWER Vegetation and Flora Observations

In addition to the above survey, DWER undertook a review of vegetation onsite, including a site visit undertaken in May 2017 which noted that the vegetation within the application area comprises predominantly of *Eucalyptus rudis, Melaleuca rhaphiophylla* and scattered *Banksia littoralis* (swamp banksia) over Melaleuca sp. and *Acacia saligna* with a variable ground layer dominated by Lepidosperma sp., generally in 'Very Good' to 'Good' condition with weed invasion around the edges (Appendix 2).

DWER also noted that within a 10 kilometre radius from the perimeter of the application area the local area retains approximately 45 per cent native vegetation cover (Appendix 2).

2.3.4 Fauna and Habitat

Given the small area of vegetation present within Lot 4800 fauna habitat opportunities have been identified as likely to be limited.

It is noted that Lot 4800 has vegetation which could provide quenda habitat opportunities but no quenda were found onsite during fauna trapping and relocation work undertaken as part of the 2019 clearing program. DWER have previously advised that the habitat for quenda is not limited to the application area with similar habitat of equal or better value remaining in the local area (Appendix 2).

2.4 August 2022 Observations

A site visit undertaken on 11 August 2022 to view the current extent of regrowth present within the previously cleared areas. The regrowth contain flora species which comprises species and similar vegetation structure which was present in these areas prior to clearing.

Photographs of this vegetation are provided in Plate 2-1to Plate 2-11. Photograph locations are noted in Plate 2-12

Plate 2-1: Site Photograph 1

Date of Photography: 11 August 2022

Plate 2-2: Site Photograph 2

Date of Photography: 11 August 2022

Plate 2-3: Site Photograph 3

Date of Photography: 11 August 2022

Plate 2-4: Site Photograph 4

Date of Photography: 11 August 2022

Plate 2-5: Site Photograph 5

Date of Photography: 11 August 2022

Plate 2-6: Site Photograph 6

Date of Photography: 11 August 2022

Plate 2-7: Site Photograph 7

Date of Photography: 11 August 2022

Plate 2-8: Site Photograph 8

Date of Photography: 11 August 2022

Plate 2-9: Site Photograph 9

Date of Photography: 11 August 2022

Plate 2-10: Site Photograph 10

Date of Photography: 11 August 2022

Plate 2-11: Site Photograph 11

Date of Photography: 11 August 2022

Plate 2-12: Site Photograph Locations

3 Assessment Against Clearing Principles

3.1 Native Vegetation should not be cleared if it comprises a high level of biological diversity

It is understood that four priority ecological communities (PEC) and six threatened ecological communities (TEC) have been recorded within the local area (DWER, 2019). The DWER site inspection undertaken in 2017 and the detailed spring flora and vegetation survey (Bennett, 2017) found that vegetation was not representative of TEC or PECs.

No threatened or priority flora species were found within the application area (Bennett, 2017).

The condition of the vegetation in the areas propsed for clearing ranged from 'Very Good-Good' to 'Good' based on the Keighery condition scale (Bennett, 2017).

Quenda were noted to potentially be present in areas of suitable habitat onsite. As a precaution trapping for quenda was undertaken prior to the last clearing program. No quenda were observed onsite or caught in the traps during this program.

The site is mapped as a Conservation Category Wetland (CCW) with vegetation representative of wetland environments.

DWER had previously noted that the application area application area may comprise a high level of biodiversity (DWER, 2019).

3.2 Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia

It is understood that nine threatened fauna, three fauna protected under international agreement, two other specially protected fauna and nine priority fauna have been recorded within the local area. Of these, the application area may contain suitable habitat for the quenda / southern brown bandicoot. (DWER, 2019).

DWER has previously noted that the application area may comprise suitable habitat for quenda, however noting the fragmented application area, the relatively small amount of proposed clearing and that vegetation in a similar condition remain in the local area, the application area is not considered a significant habitat for quenda (DWER, 2019).

The pre and during clearing fauna trapping and relocation program, which was undertaken by Western Wildlife as part of the 2019 clearing program, did not find evidence of quenda presence. The program involved deploying 20 baited cage traps across the site prior to clearing, primarily targeting Quenda. Hand searching for reptile and other fauna was also undertaken. The key results of the program included:

- No Quenda or any other species were caught in cage traps. The only mammals observed during clearing (though not captured) were a couple of rats (*Rattus rattus*) and mice (*Mus musculus*), both introduced species. It appears likely that Quenda were absent from the site.
- Hand-searching prior to and during clearing resulted in the capture and relocation of 12 Crinia (small native frogs), three *Acritoscincus trilineatum* (a small native lizard) and one *Morethia lineoocellata* (also a small native lizard). No snakes or other larger reptiles were observed.
- Fledgling Willie Wagtails (*Rhipidura leucophrys*) were observed in the site, but self-relocated prior to the commencement of clearing.

DWER previously advised that whilst the application is not considered to be significant habitat for quenda, its presence was noted during the DWER site inspection report. To avoid potential impacts to quenda

individuals that may occupy the application area at the time of clearing, a directional clearing condition was placed on the Permit (DWER, 2019).

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

DBCA has previously advised that the following threatened flora species may occur within the application area (Parks and Wildlife, 2017):

- *Grevillea curviloba* subsp. *curviloba* (critically endangered)
- *Trithuria occidentalis* (critically endangered)
- *Eleocharis keigheryi* (vulnerable)

The detailed flora and vegetation survey undertaken for the site in spring 2017 did not identify the presence of any rare flora onsite (Bennett, 2017).

Following review of the 2017 flora and vegetation survey for the site, DBCA noted that some portions of the application area were too inundated to record the threatened flora species outlined above, however these species would have been identifiable at the time of the survey using the methods outlined in the survey report (DBCA, 2017). DBCA advised that from the information provided, it appears unlikely that the above species of threatened flora occur within the application area (DBCA, 2017).

Given the above, DBCA has previously advised that the application area is not likely to include, or be necessary for the continued existence of, threatened flora (DWER, 2019).

3.4 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

As part of the previous application assessment for the site Parks and Wildlife advised that, based on DWER's site inspection, the Banksia Woodlands TEC is not likely to occur within the application area. DBCA also advised that based on available evidence it appears unlikely that any TECs occur in the wetlands within the application area (DBCA, 2017).

No TECs were located during the 2017 flora and vegetation survey (Bennett, 2017). The survey infers that the vegetation units present as floristic community types 11 and 4 (Bennett, 2017).

On the basis of the above, it was concluded that the application area was not likely to comprise the whole or a part of, or be necessary for the maintenance of, a TEC (DWER, 2019).

3.5 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 remaining vegetation extents relevant to the vegetation management/clearing proposed are as follows:

Table 3-1: Vegetation Extents

Location	Pre-European	Current Extent	Current Extent in DBCA managed lands
IBRA Bioregion (DWER, 2019)			
Swan Coastal Plain	1,501,221 ha	578,432 ha (38.5%)	38 ha

Location	Pre-European	Current Extent	Current Extent in DBCA managed lands
Heddle Vegetation Complex (Govt of WA, 2019)			
Southern River Complex (within bioregion)	58,781 ha	10,832 ha (18.4%)	940 ha (1.6%)
Bassendean Complex – North (within bioregion)	79,057 ha	56,660 ha (71.7%)	30,559 ha (38.7%)

As can be seen from Table 3-1 the remaining extents of native vegetation within the IBRA bioregion is above the 30 per cent target threshold. Mapped vegetation type Bassendean Complex – North is also above the 30 per cent target threshold, however Southern River Complex falls below this level (Table 3-1).

The Environmental Protection Authority (EPA) recognises the Perth Metropolitan Region to be a constrained area, within which a minimum 10 per cent representation threshold for ecological communities is recommended (EPA, 2008 & DWER, 2019).

DWER have previously advised that the local area is estimated to retain approximately 45 per cent native vegetation cover, a large portion of which is contained within conservation areas. On this basis, the application area is not likely to be located within an area that has been extensively cleared (DWER, 2019).

DWER have previously concluded that while the application area may comprise a significant remnant, primarily due its wetland values, it is not considered to be within an area that has been extensively cleared. The proposed clearing is therefore not likely to be at variance to this Principle (DWER, 2019).

3.6 Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland

The majority of the application area is mapped as CCW UFI 15065 'Bordeaux Lane' palusplain (seasonally waterlogged flat) of approximately 35.6 hectares in total area (DWER, 2019).

DWER has previously acknowledged that the proposed clearing will result in the direct loss of vegetation growing in, and in association with, a CCW (DWER, 2019).

DWER previously acknowledged that the CCW is question was part of a previous NPS which would result in this area being lost through development. This action resulted in over 27 hectares of land with significant environmental values transferred to the crown and reserved for conservation to enable the surrounding urban development. The Delegated Officer therefore considered that no further Offset was required for the proposed clearing (DWER, 2019).

3.7 Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation

The following key conclusions were previously made by DWER in relation to vegetation clearing and potential land degradation (DWER, 2019):

- The presence of surface water in autumn suggests that the application area is poorly drained, and that the proposed clearing may increase the risk of waterlogging and phosphorus export. Noting the size, shape and relatively flat topography of the application area, the proposed clearing is unlikely to result in water erosion, or contribute to an increase in flooding
- The proposed clearing also has the potential to contribute to changes in salinity, however noting the extent of the proposed clearing this impact is expected to be minimal

- The proposed clearing may cause appreciable land degradation in the form of increased waterlogging and phosphorus export, and may be at variance to this Principle

3.8 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 areas

The local area contains a number of conservation areas including local public open space and Bush Forever sites. The location of vegetated POS areas and Bush Forever sites is shown on Plate 3-1. The nearby conservation areas are separated from the application area by residential development and roads.

DWER have previously concluded that the proposed clearing is not likely to have an impact on the environmental values of nearby conservation areas (DWER, 2019).

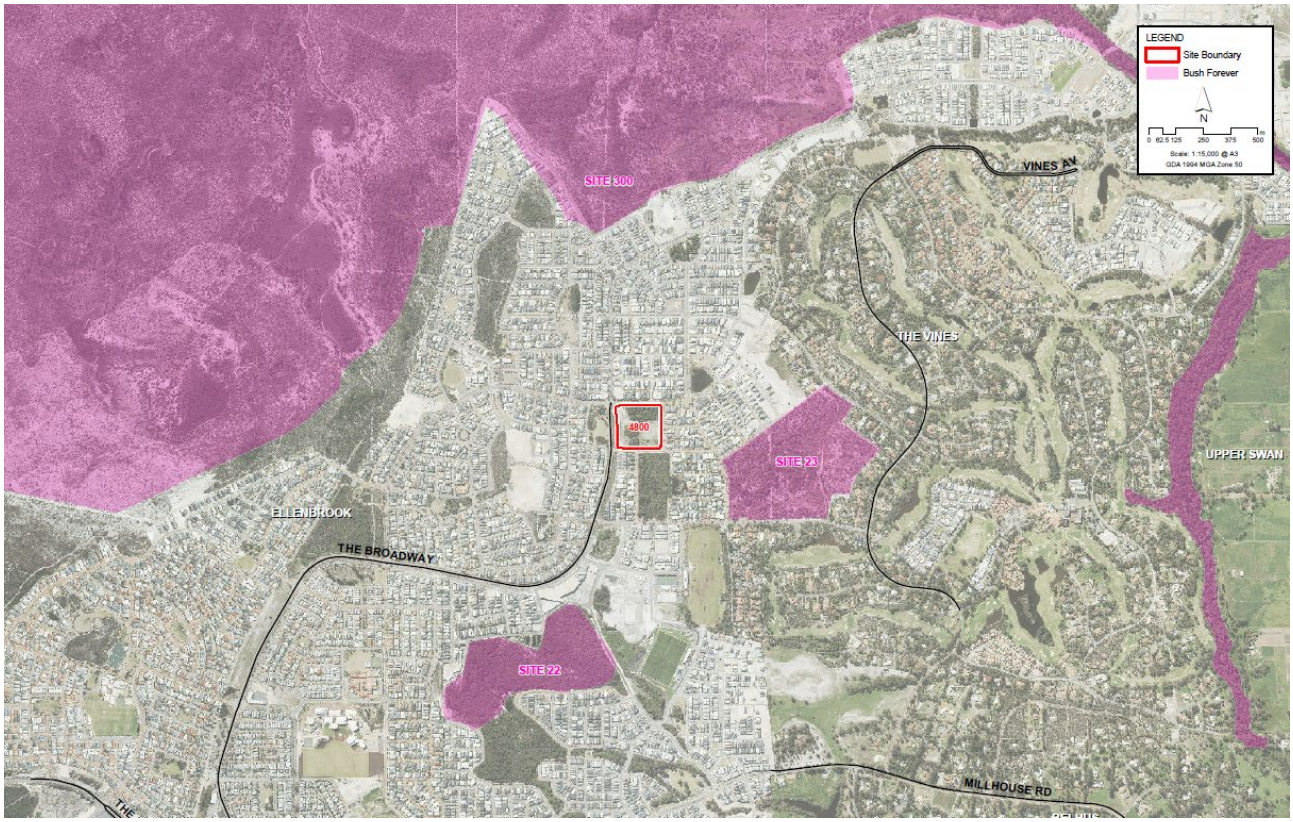

Plate 3-1: Bush Forever Sites and Vegetated POS

3.9 Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of the surface or underground water

The clearing of Lot 4800 has been taken into consideration during the planning and design of the urban development. Water management for this area was considered as part of the Urban Water Management Plan prepared for the site. This report was assessed and approved by the (then) Department of Water. Clearing as proposed onsite is not anticipated to have a detrimental impact on surface or groundwater resources.

DWER have previously noted that the proposed clearing may cause deterioration in the quality of surface water as a result of waterlogging and nutrient export, as referenced in Section 3.7.

DWER had further noted that given the fragmented nature of the clearing area, the small amount of clearing and the historical disturbance to the area, it is considered unlikely the proposed clearing will have a significant impact on the quality of surface or underground water (DWER, 2019).

3.10 Native Vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding

DWER have previously concluded that based on the size, shape and relatively flat topography of the application area, and the extent of development in the surrounding area, the proposed clearing is unlikely to contribute to an increase in flooding (DWER, 2019).

4 Conclusion

The clearing proposed in this application is for the same area and extent which was approved by DWER in 2019 via CPS 7538-1. The factors relevant to the site has not changed since this approval was issued and the vegetation regrowth comprises species which were present in these areas prior to clearing.

The CoS have indicated support for the vegetation maintenance/clearing works which can be confirmed through consultation with the officers listed in Section 1.2.

5 References

Bennett, E. (2017) Vegetation and Flora of Lot 4800 Moseley Drive, The Vines. Prepared for Coterra Environment, dated September 2017.

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Figures

LEGEND

- Site Boundary
- Cadastre
- Vegetation to be Cleared (Note: Retention of selected individual trees within this area)

N

0 5 10 20 30 40 m

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

LOT 4800

ELMRIDGE PWY
BANROCK DR
ACKWORTH GRA
THE BROADWAY
BENDORA TURN
MOSELEY DR
TATTON WY
ALTHROP WY
EASTNOR WY

Source: Cadastre - Landgate
Orthophoto - Nearmaps, 15.04.22

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

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COTERRA ENVIRONMENT
Job: DBAELL07
Doc: 001
Date: 11/08/2022
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

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NATIVE VEGETATION CLEARING PERMIT APPLICATION
LOT 4800 MOSELEY DRIVE, THE VINES

AERIAL PHOTOGRAPH

Figure 1

LEGEND

- Site Boundary
- Cadastre
- Vegetation to be Cleared (Note: Retention of selected individual trees within this area)

Geomorphic Wetlands

- Conservation

N

0 5 10 20 30 40 m

Scale: 1:1,000 @ A3

GDA 1994 MGA Zone 50

LOT 4800

UFI: 15085

ELMRIDGE PWY

BANROCK DR

ACKWORTH GRA

EASTNOR WY

ALTHROP WY

MOSELEY DR

THE BROADWAY

BENDORA TURN

TATTON WY

6610 2, 7216, 7217, 7218, 7219, 7220, 7221, 7222, 5801, 5802, 5803, 5804, 5805, 5800, 5799, 5798, 5797, 5796, 5795, 5794, 5793, 5792, 5745, 5746, 5762, 5763, 5764, 5747, 5761, 5760, 5759, 5758, 5748, 5757, 5749, 5751, 5752, 5753, 5754, 5750, 9280, 6777, 6776, 5, 6, 4805, 11, 4818, 4, 7, 4817, 8

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Source: Cadastre - Landgate
Wetlands - DBCA, 2022
Orthophoto - Nearmaps, 15.04.22

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Job: DBAELL07
Doc: 002
Date: 11/08/2022
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

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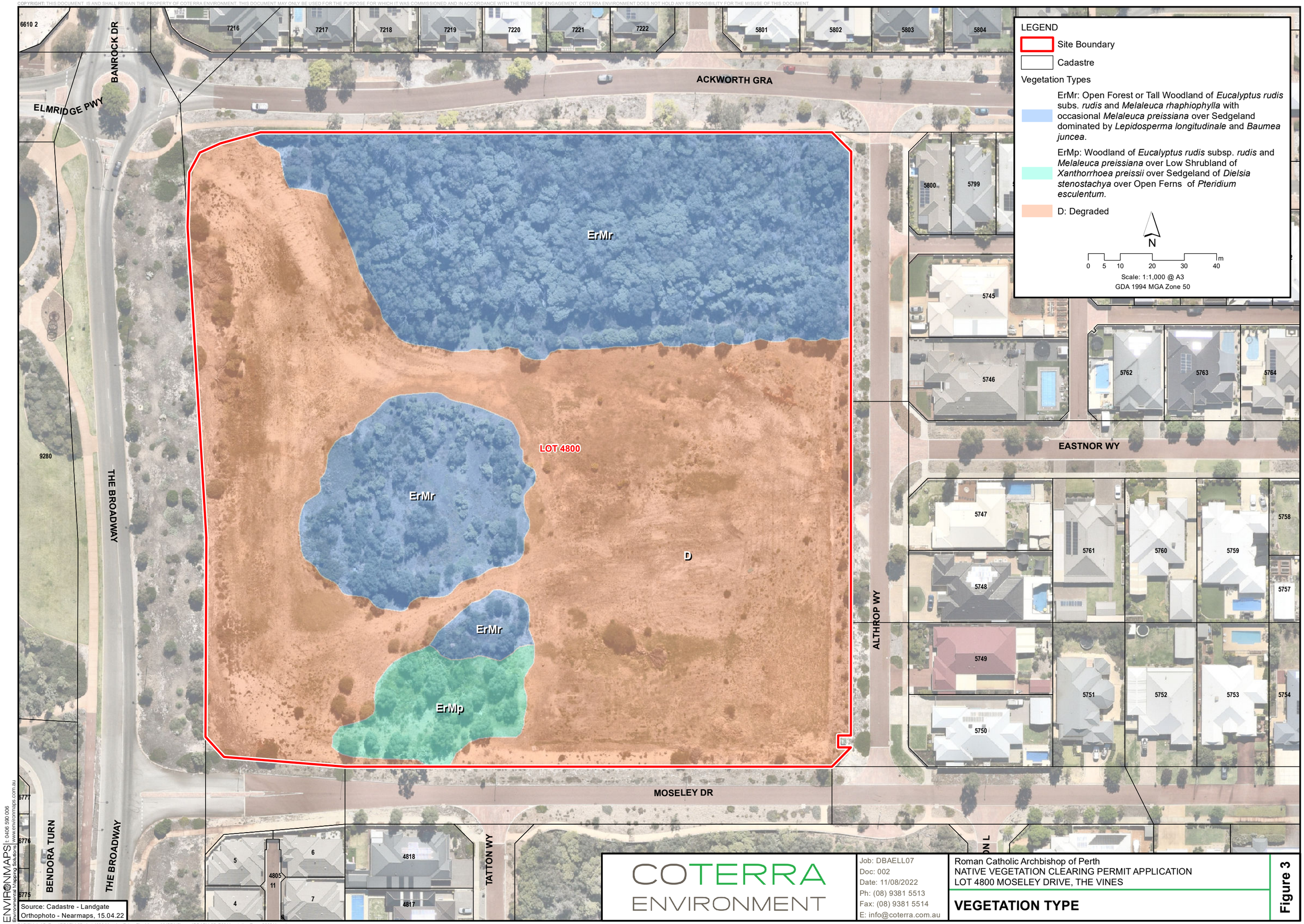
GEOMORPHIC WETLAND MAPPING

Figure 2



LEGEND

Site Boundary

Cadastre

Vegetation Types

ErMr: Open Forest or Tall Woodland of *Eucalyptus rudis* subs. *rudis* and *Melaleuca rhaphiophylla* with occasional *Melaleuca preissiana* over Sedgeland dominated by *Lepidosperma longitudinale* and *Baumea juncea*.

ErMp: Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* over Low Shrubland of *Xanthorrhoea preissii* over Sedgeland of *Dielsia stenostachya* over Open Ferns of *Pteridium esculentum*.

D: Degraded

N

0 5 10 20 30 40 m

Scale: 1:1,000 @ A3

GDA 1994 MGA Zone 50

Source: Cadastre - Landgate
Orthophoto - Nearmaps, 15.04.22

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Job: DBAELL07
Doc: 002
Date: 11/08/2022
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

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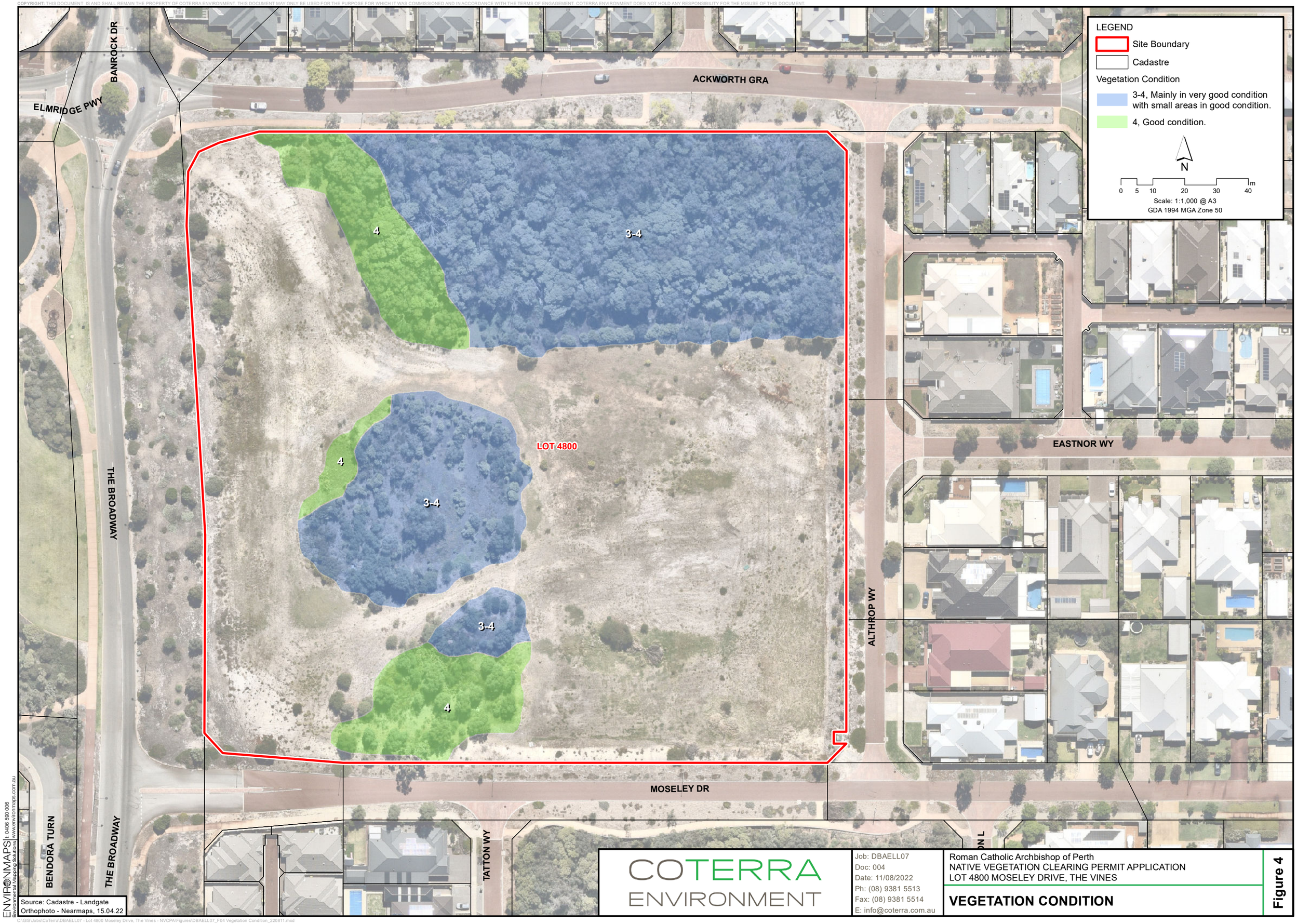
LOT 4800 MOSELEY DRIVE, THE VINES

VEGETATION TYPE

Figure 3



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Job: DBAELL07
Doc: 004
Date: 11/08/2022
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

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NATIVE VEGETATION CLEARING PERMIT APPLICATION
LOT 4800 MOSELEY DRIVE, THE VINES

VEGETATION CONDITION

Figure 4

Appendix 1 Development Application Approval (DA-225/2017)

Our Ref: DA-225/2017
Officer: Asha Logan
Phone: 08 9267 9368
Email: Asha.Logan@swan.wa.gov.au
Fax: 9267 9444

19 February 2018

Coterra Environment
Level 3, 25 Prowse St
WEST PERTH WA 6005

Dear Sir/Madam

STATE ADMINISTRATIVE TRIBUNAL - RECONDISERATION OF PROPOSED CLEARING OF NATIVE VEGETATION - LOT 4800 MOSELEY DRIVE, THE VINES

I refer to your Application for Planning Approval for the above lot dated 24 March 2017

In accordance with the provisions of the City's *Local Planning Scheme No.17* and the *planning and Development (Local Planning Schemes) Regulations 2015* **approval to commence development was granted by Council** at its meeting held on 14 February 2018 subject to conditions. Attached is the Notice of Determination stating the conditions that must be complied with.

If an applicant is aggrieved by this Determination, there is a right of review under Part 14 of the *Planning and Development Act 2005*. An application for review should be lodged with the State Administrative Tribunal (Level 4, 12 St George Terrace, Perth) within twenty eight (28) days of the date of this determination (application may be made to the Tribunal to extend this time period). The necessary "Application for Review" forms are available from the State Administrative Tribunal.

It should be noted that this approval does not constitute a building permit.

Should you have any queries regarding this matter, please do not hesitate to contact Asha Logan on 08 9267 9368.

Yours faithfully

for M J Foley
CHIEF EXECUTIVE OFFICER

Enc:

cc. Roman Catholic Archbishop C/- Catholic Archdiocese of Perth, Administration Centre, GPO Box M962, PERTH WA 6843

Planning and Development Act 2005

CITY OF SWAN

Notice of Determination on Application for Planning Approval

Ref. No: DA-225/2017
Determination Date: 19-Feb-2018
Est. Value: $2000

Location:	**LOT 4800 MOSELEY DRIVE, THE VINES**		
Title (Vol/Folio):	**CT-2661/772**	**Plan /Diagram:**	**52626**
Application Date:	**24 MARCH 2017**		

Description of proposed development:

STATE ADMINISTRATIVE TRIBUNAL - RECONSIDERATION OF PROPOSED CLEARING OF NATIVE VEGETATION

The following decision was made by Council, at its meeting held on 14 February 2018:

1) Grant approval for the proposed Clearing of Vegetation on Lot 4800 Moseley Drive, The Vines, subject to the following conditions:

2) The City is to performance manage the conditions set out in this resolution on an annual basis to ensure compliance.

3) Record the reason for changing the staff recommendation is to include as Conditions undertakings given by the applicant at the State Administrative Tribunal mediation.

CONDITIONS:

1. This approval is for the clearing of vegetation as depicted on the approved plan.

2. Four (4) pylon signs visible from the road reserve and clearly notifying the public that a Catholic primary school is planned to be established on the land shall be erected and maintained on the lot by the landowner in the locations as depicted on the approved plan. The signs shall remain on the lot until an approved development is substantially commenced on the land, or otherwise in the event that the lot is sold.
3. Prior to the commencement of the approved works on the lot the landowner shall prepare, and have approved by the City, a Dust Management Plan. The Dust Management Plan shall outline measures to stabilise soil on the lot and to prevent

erosion and dust blowing at all times, and shall include appropriate measures to be implemented by the landowner within a specified time and manner in the event that sand or dust is blown or drifts from the lot.

4. The cleared areas on the lot shall be maintained in a low fuel state to the satisfaction of the City.

5. Felled vegetation and other dead material, and debris shall be removed from the lot at the conclusion of clearing works.

6. If the clearing works cause any obstruction, alteration or interference with a natural flow of surface water to the detriment of surrounding land, then the landowner shall rectify the cause of such obstruction, alteration or interference to the satisfaction of the City.

7. Any additional development, which is not in accordance with the application (the subject of this approval) or any condition of approval, will require further approval of the City.

8. Prior to commencement of the approved works the applicant/owner is to submit to the satisfaction of the Chief Executive Officer a Landscaping Plan for the provision of a landscaping strip along the full length of the subject lot abutting Althrop Way.

9. The landscaping as per the approved Landscaping Plan is to be installed by the owner and maintained thereafter to the satisfaction of the Chief Executive Officer.

10. Prior to commencement of the approved works the applicant/owner is to:

    i. undertake a fauna survey of the subject lot to identify any fauna habitat in those areas of vegetation designated to be cleared; and

    ii. make arrangements for the relocation of any such identified fauna to an alternative location to the satisfaction of the Chief Executive Officer.

ADVICE TO APPLICANT:

1) This is a Development Approval of the City of Swan under its Local Planning Scheme No. 17. It is not a building permit or an approval to commence or carry out development under any other law. It is the responsibility of the applicant to obtain any other necessary approvals, consents, permits and licenses required under any other law, and to commence and carry out development in accordance with all relevant laws.

2) Development may be carried out only in accordance with the terms of the application as approved herein and any approved plan.

3) This approval is not an authority to ignore any constraint to development on the land, which may exist through contract or on title, such as an easement or restrictive covenant. It is the responsibility of the applicant and not the City to investigate any such constraints before commencing development. This approval will not necessarily have regard to any such constraint to development, regardless of whether or not it has been drawn to the City's attention.

4) The carrying on of the development must not cause a dust nuisance to neighbours. Where appropriate such measures as installation of sprinklers, use of water tanks, mulching or other land management systems should be installed or implemented to prevent or control dust nuisance, and such measures shall be installed or

implemented within the time and in the manner directed by the City's Principal Environmental Health Officer if it is considered that a dust nuisance exists.

5) The Department of Planning, Lands and Heritage (DPLH) recommends that the landowner/developer consider the DPLH's *Aboriginal Heritage Due Diligence Guidelines* when planning to undertake the works in order to identify and mitigate risks to Aboriginal heritage sites. The Guidelines are available for download at https://www.daa.wa.gov.au/

It is also recommended that the landowner/developer contact the South West Aboriginal Land and Sea Council (SWALSC) who represent the Whadjuk People Native Title Claim Group and provide them with a copy of the proposal and seek their comments.

Contact details for the SWALSC are available from the DPLH or City of Swan.

6) Kerbs, roadways, footpaths, open drains, stormwater pits, service authority pits and nature strips must be adequately protected during the construction of the development.

7) The City of Swan is authorised and liable for the maintenance and repair of roads under its control within its boundary and pursuant to Section 84 of the Road Traffic Act. The City is authorised to recover costs from the applicant, for the repair and maintenance of these roads if any damage is caused as part of this development to the kerb, footpath, drainage pits, stormwater system, landscaping or signs located within the road reserve.

8) The landowner, applicant or developer must notify the City if they wish to place, store, use, obstruct and/or barricade the road reserve to assist in the development of this property.

Note 1: **If the development the subject of this approval is not substantially commenced within a period of 2 years, or another period specified in the approval after the date of the determination, the approval will lapse and be of no further effect.**

Note 2: **Where an approval has so lapsed, no development must be carried out without the further approval of the local government having first been sought and obtained.**

Note 3: **If an applicant or owner is aggrieved by this determination there is a right of review by the State Administrative Tribunal in accordance with the *Planning and Development Act 2005* Part 14. An application must be made within 28 days of the determination.**

for M J Foley
CHIEF EXECUTIVE OFFICER

LEGEND

- Site Boundary
- Cadastre
- Proposed Signage
- The Broadway Road Reserve Vegetation
- Vegetation to be Retained Onsite (0.85 ha)
- Landscape Vegetation to be Retained (0.12 ha; excludes path areas)
- Vegetation to be Cleared (Note: Retention of selected individual trees within this area)

N

0 5 10 20 30 40 m

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

LOT 4800

City of Swan
APPROVED PLAN
Sheet 1 of 3
File No: DA225-17
This plan relates to the application for commencement of development granted by Council at its Ordinary Meeting held on 14/2/2018

Source: Cadastre - Landgate, 2015
Orthophoto - Nearmaps, 28.10.16

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

COTERRA ENVIRONMENT
Job: DBAELL01
Doc: 0A1
Date: 18/12/2017
Ph: (08) 9381 5513
Fax: (08) 9381 5514
E: info@coterra.com.au

Roman Catholic Archbishop of Perth
SAT PROCEEDINGS
LOT 4800 MOSELEY DRIVE, THE VINES

REVISED CLEARING PROPOSAL

Figure A1

City of Swan
APPROVED PLAN
No. 2 of 3
File No. DA225-17
This plan relates to the approval to commence development granted by Council at its Ordinary Meeting held on 14/2/2018

SUPERSIGNS

ARTWORK & DESIGN CONCEPT

CLIENT:

David Barnao

PROJECT:

4 off 1500x1200mm sign

PROOF#	REVISION DATE#	DESCRIPTION
01	19/12/17	DESIGN LAYOUT

CLIENT APPROVAL

- ☐ I HAVE CHECKED THAT ALL CONTENT, SPELLING, PHONE NUMBERS AND GRAMMAR IS CORRECT
- ☐ I HAVE CHECKED ALL COLOURS, SIZING AND QUANTITIES (IF NOTED) ARE CORRECT
- ☐ I APPROVE THIS ARTWORK AS CORRECT AND READY FOR PRINT AND OR MANUFACTURING PRODUCTION

NAME:

SIGNATURE:

APPROVAL DATE:

The onus is solely on the client to check ALL details carefully. By approving this proof, you accept full responsibility for the final product. Supersigns will not take any responsibility for errors that occur on artwork after it has been approved by the client.

Post production edits will incur additional fees and charge.

Vegetation Context Plan

COTERRA ENVIRONMENT

Job DBAELL01
Doc. 001
Date 30/01/2017
Ph (08) 9381 5513
Fax (08) 9381 5514

Catholic Archdiocese of Perth

LOT 4800 MOSELEY DRIVE, THE VINES

24 MAR 2017
RECEIVED

PROPOSED CLEARING EXTENT

Figure 1

Appendix 2 DWER Clearing Permit and Decision Report (CPS 7538/1)

GOVERNMENT OF
WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

PERMIT DETAILS
Area Permit Number: 7538/1
File Number: DER2017/000437-1
Duration of Permit: From 8 September 2019 to 8 September 2021

PERMIT HOLDER
Roman Catholic Archbishop of Perth

LAND ON WHICH CLEARING IS TO BE DONE
Lot 4800 on Deposited Plan 52626, The Vines

AUTHORISED ACTIVITY
The Permit Holder shall not clear more than 0.73 hectares of native vegetation within the area hatched yellow on attached Plan 7538/1.

CONDITIONS

1. **Avoid, minimise and reduce the impacts and extent of clearing**
   In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference:
   (a) avoid the clearing of native vegetation;
   (b) minimise the amount of native vegetation to be cleared; and
   (c) reduce the impact of clearing on any environmental value.

2. **Weed and Dieback control**
   When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds* and *dieback*:
   (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
   (b) ensure that no known *dieback or weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
   (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

3. **Direction of clearing**
   The Permit Holder shall conduct clearing in a slow progressive manner from one direction to the other (e.g. east to west) to allow fauna to move into adjacent native vegetation ahead of the clearing activity.

4. **Records must be kept**
   The Permit Holder must maintain the following records for activities done pursuant to this Permit, in relation to the clearing of native vegetation authorised under this Permit:
   (a) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
   (b) the date that the area was cleared;
   (c) the size of the area cleared (in hectares); and

(d) actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 1 of this Permit.
(e) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 2 of this Permit.

5. Records must be kept

(a) The Permit Holder must provide to the *CEO* on or before 30 June of each year, a written report:
  (i) of records required under condition 4 of this Permit; and
  (ii) concerning activities done by the Permit Holder under this Permit between 1 January and 31 December of the preceding calendar year.

(a) If no clearing authorised under this Permit was undertaken between 1 January to 31 December of the preceding calendar year, a written report confirming that no clearing under this permit has been carried out, must be provided to the *CEO* on or before 30 June of each year.

(b) Prior to 8 June 2021 the Permit Holder must provide to the *CEO* a written report of records required under condition 4 of this Permit where these records have not already been provided under condition 5(a) of this Permit.

DEFINITIONS

The following meanings are given to terms used in this Permit:

CEO means the Chief Executive Officer of the Department responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*.

dieback means the effect of *Phytophthora* species on native vegetation;

fill means material used to increase the ground level, or fill a hollow;

mulch means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

weed/s means any plant -

(a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or
(b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or
(c) not indigenous to the area concerned.

Mathew Gannaway
MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under Section 20
of the Environmental Protection Act 1986

9 August 2019

Plan 7538/1

Legend

- Roads - Local and Others
- Imagery
- Cadastre
- Clearing Instruments Activities

N

0 100m

1:2,179

(Approximate when reproduced at A4)

GDA 94 (Lat/Long)

Geocentric Datum of Australia 1994

Mathew Gannaway ..... Date 9 August 2019

Officer with delegated authority under Section 20 of the Environmental Protection Act 1986

GOVERNMENT OF WESTERN AUSTRALIA

Government of Western Australia
Department of Water and Environmental Regulation

Clearing Permit Decision Report

1. Application details

1.1. Permit application details

Permit application No.: CPS 7538/1
Permit type: Area Permit

1.2. Applicant details

Applicant's name: The Roman Catholic Archbishop of Perth
Application received date: 23 March 2017

1.3. Property details

Property: Lot 4800 on Deposited Plan 52626, The Vines
Local Government Authority: Swan, City of
Localities: The Vines

1.4. Application

Clearing Area (ha)	No. Trees	Method of Clearing	For the purpose of:
0.73 (as revised)		Mechanical Removal	Stockpile/bulk earthworks bushfire hazrd reduction

1.5. Decision on application

Decision on Permit Application: Grant
Decision Date: 9 August 2019
Reasons for Decision: The clearing permit application was received on 23 March 2017 and has been assessed against the clearing principles, planning instruments and other matters in accordance with section 51O of the *Environmental Protection Act 1986* (EP Act). It has been concluded that the proposed clearing is at variance to principle (f), may be at variance to principles (a), (b), (g) and (i), and is not likely to be at variance to the remaining principles.

The Delegated Officer noted that the proposed clearing will directly impact on native vegetation growing in association with a 'conservation category' wetland (CCW), may result in land degradation leading to deterioration in the quality of surface water that may also impact on the hydrological and ecological values of a nearby CCW. A weed and dieback management condition has been placed on the clearing permit to minimise the risk of weeds and dieback spreading into adjacent vegetation.

The Delegated Officer noted that the application may impact upon suitable habitat for the quenda / southern brown bandicoot. However it is noted that the habitat for the quenda is not limited to the application area with similar habitat of equal or better value remaining in the local area. To avoid potential impacts to quenda that may occupy the application area, the Delegated Officer has placed a directional clearing condition on the Permit.

In determining to grant the clearing permit, the Delegated Officer noted that development approval had been obtained from the City of Swan, and that bushfire mitigation is within the parameters of State Planning Policy 3.7 - Planning in Bushfire Prone Areas. The Delegated formed the view that the proposed clearing is justified at in accordance to the negotiated planning outcome which resulted in the transferring of a 27 (26.8) hectare portion to the Western Australian Planning Commission as a Bush Forever site and was satisfied that no further land swap (offset) was needed in relation to the residual environmental impacts identified during the assessment.

2. Site Information

Clearing Description: The revised application is for the clearing of 0.73 hectares of native vegetation within Lot 4800 on Deposited Plan 52626 (Lot 4800), The Vines, for the purposes of preliminary works for school construction and bushfire hazard reduction.

Vegetation Description and Condition: The application area is mapped as the following Heddle vegetation complexes:

- Southern River Complex: Open Woodland of *Corymbia calophylla* (marri) – *Eucalyptus marginata* (jarrah) – *Banksia* species with fringing Woodland of *Eucalyptus rudis* (flooded gum) – *Melaleuca rhaphiophylla* (swamp paperbark) along creek beds; and
- Bassendean Complex-North: vegetation ranges from a Low Open Forest and Low Open Woodland of *Banksia* species *Eucalyptus todtiana* (pricklybark) to Low Woodland of *Melaleuca* species and Sedgelands which occupy the moister sites (Heddle et al., 1980).

In support of the application, the applicant provided a flora and vegetation survey undertaken in March 1999. The 1999 flora and vegetation survey indicates that the application area is likely to comprise three vegetation units in 'Excellent' condition:

- *Acacia saligna* (golden wattle) Open to Closed Tall Scrub;
- *Melaleuca viminea* (mohan) Open to Closed Tall Scrub; and
- *Eucalyptus rudis* Open to Closed Forest (Weston, 1999).

A site inspection was undertaken by officers of the former Department of Environment Regulation (DER) on 22 May 2017. The site inspection found that the vegetation within the application area comprises predominantly of *Eucalyptus rudis*, *Melaleuca rhaphiophylla* and scattered *Banksia littoralis* (swamp banksia) over *Melaleuca sp.* and *Acacia saligna* with a variable ground layer dominated by *Lepidosperma* sp., generally in 'Very Good' to 'Good' condition with weed invasion around the edges (refer to Figures 4, 5 and 6) (DER, 2017).

In response to a request by the Department of Water and Environmental Regulation (DWER) for further information to inform the assessment of the application, the applicant provided a Level 2 flora and vegetation survey undertaken in September 2017. The 2017 flora and vegetation survey identified two vegetation units within the application area varying between 'Very Good' and 'Good' condition:

- Open Forest or Tall Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca rhaphiophylla* with occasional *Melaleuca preissiana* (moonah) over Sedgeland dominated by *Lepidosperma longitudinale* (pithy sword-sedge) and *Baumea juncea* (bare twigrush) – inferred to be floristic community type 11; and
- Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* over Low Shrubland of *Xanthorrhoea preissii* (grasstree) over Sedgeland of *Dielsia stenostachya* over Open Ferns of *Pteridium esculentum* (bracken) – inferred to be floristic community type 4 (Bennett, 2017).

Vegetation condition definitions:

- Excellent: Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species (Keighery, 1994).
- Very Good: Vegetation structure altered; obvious signs of disturbance (Keighery, 1994).
- Good: Vegetation structure significantly altered by very obvious signs of multiple disturbance; retains basic structure or ability to regenerate (Keighery 1994).

Soil / Landform Type: The application area is mapped as the Bassendean, Jandakot Phase system, described as grey sand over pale yellow sands generally underlain by humic and iron podsols (Schoknecht et al., 2004).

Comment The local area considered in the assessment of this application is defined as a 10 kilometre radius from the perimeter of the application area. The local area retains approximately 45 per cent native vegetation cover.

Figure 1: Map of original application area – hatched yellow (Coterra Environment, 2017)

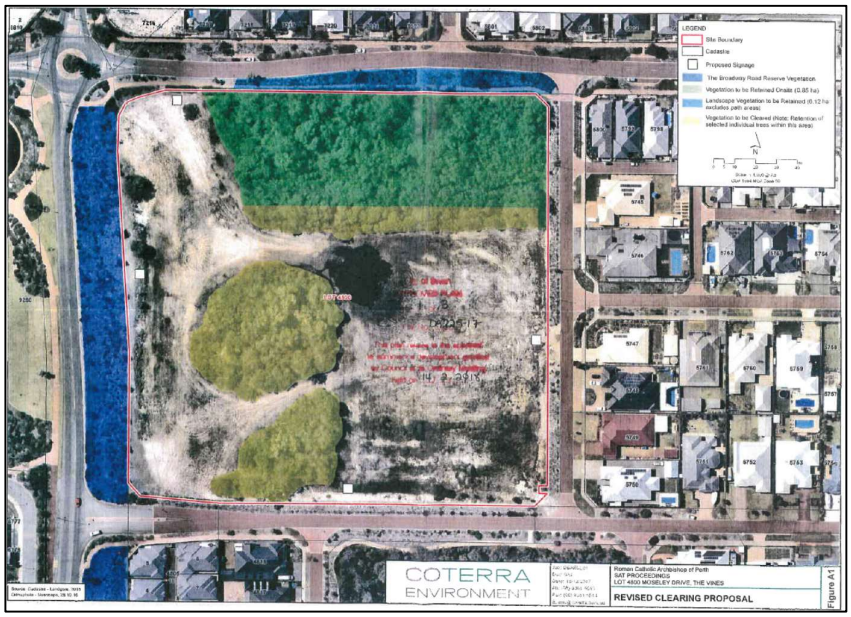

Figure 2: Map of revised application area – shaded yellow (Coterra Environment, 2017)

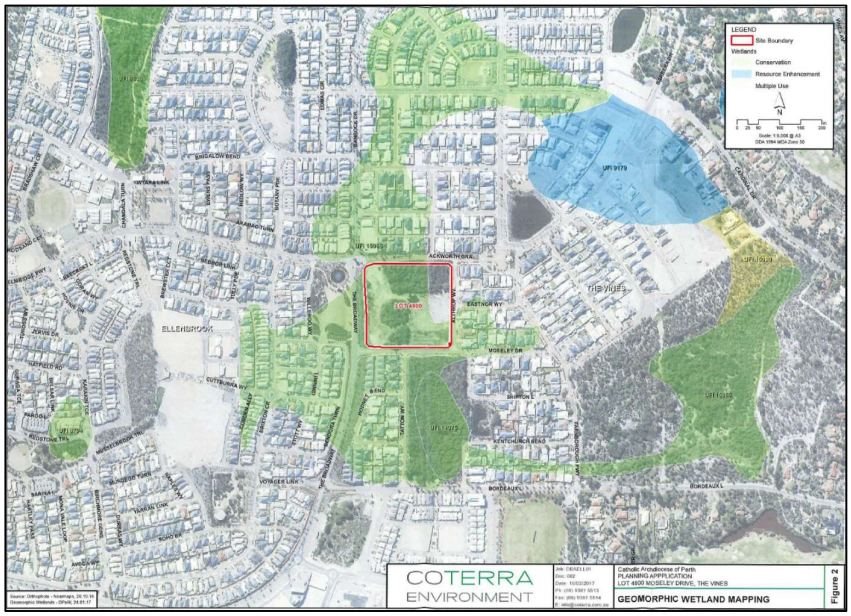

Figure 3: Extent of Lot 4800 within 'conservation category' wetland (Coterra Environment, 2017)

Figure 4: Typical vegetation along southern edge of northern portion of application area

Figure 5: Typical vegetation within central portion of application area

Figure 6: Typical vegetation within southern portion of application area

3. Minimisation and mitigation measures

The applicant revised the application during the assessment to exclude 0.85 hectares of native vegetation within the northern portion of the original application area (indicated by the area shaded green in Figure 2), in accordance with the City of Swan's development approval. The exclusion of the 0.85 hectare remnant reduced the proposed clearing area to 0.73 hectares of native vegetation.

4. Assessment of application against clearing principles

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

Proposed clearing may be at variance to this Principle

According to available databases, 27 species of priority flora have been recorded within the local area. Of these, two Priority 3 species and one Priority 4 species have been recorded from habitats with similar soil and vegetation types as found within the application area. Noting the known ranges of these species and their preferred habitats, including soil and vegetation types, the application area may comprise suitable habitat for one of these species. The former Department of Parks and Wildlife (Parks and Wildlife) advised that *Cyathochaeta teretifolia* (Priority 3) may occur within the application area (Parks and Wildlife, 2017a):

- *Cyathochaeta teretifolia* (Priority 3) is known from 39 recorded populations between Bullsbrook to Augusta and along the south coast to west of Albany, from sand and sandy clay associated with swamps and creek edges (WA Herbarium, 1998-). Noting the preferred habitats for this species, including soil/landform and vegetation types, the application area may comprise suitable habitat for this species. Priority 3 flora species are known from several locations, and these species do 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 (Jones, 2015).

According to available databases, four priority ecological communities (PEC) and six threatened ecological communities (TEC) have been recorded within the local area. Approximately 42 per cent (0.31 hectares) of the application area (within the northern and central portions) is mapped as the ecological community 'Low lying *Banksia attenuata* woodlands or shrublands ('community type 21c')', which is listed as a Priority 3 PEC by the Department of Biodiversity, Conservation and Attractions (DBCA) and is a component of the Commonwealth-listed 'Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region' (Banksia Woodlands) TEC. The site inspection found that vegetation representative of this PEC does not occur within the application area, and that the application area is unlikely to resemble the remaining three PECs recorded in the local area (DER, 2017).

As outlined in Section 2, in response to DWER's request for further information, the applicant provided a 2017 flora and vegetation survey of the application area. No threatened or priority species, or PECs or TECs, were located during the 2017 flora and vegetation survey (Bennett, 2017). Threatened flora are discussed further under Principle (c). TECs are discussed further under Principle (d).

Of the conservation-significant fauna species recorded within the local area, the application area may comprise suitable habitat for the quenda / southern brown bandicoot (*Isoodon obesulus* subsp. *fusciventer*; Priority 4). Habitats for indigenous fauna are discussed further under Principle (b).

The majority of the application area is mapped as a 'conservation category' wetland (CCW) UFI 15065 'Bordeaux Lane' (refer to Figure 3). As indicated in Figure 3, the mapped wetland complex within which the application area is located has been extensively cleared for development. Approximately 13.5 per cent of this palusplain area retains values consistent with CCW criteria (Parks and Wildlife, 2017b). Wetlands and watercourses are discussed further under Principle (f).

Noting the extent of development in the local area particularly in close proximity to the application area (refer to Figure 1), the condition of the vegetation within the application area, may contain quenda (Priority 4) habitat, and the presence of a CCW, the application area may comprise a high level of biodiversity. The proposed clearing may be at variance to this Principle.

(b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna.

Proposed clearing may be at variance to this Principle

As outlined in Section 2, the vegetation within the application area is in 'Very Good' (Keighery, 1994) to 'Good' (Keighery, 1994) condition, and comprises predominantly of *Eucalyptus rudis*, *Melaleuca rhaphiophylla* and scattered *Banksia littoralis* over *Melaleuca sp.* and *Acacia saligna* with the ground cover consisting of a variety of species with the most prominent being *Lepidosperma* sp. (DER, 2017).

According to available databases, nine threatened fauna, three fauna protected under international agreement, two other specially protected fauna and nine priority fauna have been recorded within the local area (DBCA, 2007-). Of these, the application area may contain suitable habitat for the quenda / southern brown bandicoot.

The quenda / southern brown bandicoot prefers areas with dense understorey vegetation, particularly around swamps and watercourses that provides protection from predators (DEC, 2012). This species is also commonly found around wet areas adjacent to dryland vegetation (DEC, 2012). The site inspection identified that suitable habitat for quenda is present within the application area, and observed a number of diggings and scats consistent with quenda activity (DER, 2017). Noting the extent of development in the local area particularly in close proximity to the application area (refer to Figure 1), the application area may comprise suitable habitat for this species. However noting the fragmented application area, the relatively small amount of proposed clearing and that vegetation in a similar condition remain in the local area, the application area is not considered significant habitat for quenda.

Given the above, the application area may comprise the whole or part of, or be necessary for the maintenance of suitable habitat for quenda. The proposed clearing may be at variance to this Principle.

Whilst the application is not considered to be significant habitat for quenda, its presence was noted during the site inspection report. To avoid potential impacts to quenda individuals that may occupy the application area at the time of clearing, a directional clearing condition has been placed on the Permit.

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

Proposed clearing is not likely to be at variance to this Principle

According to available databases, four threatened flora species have been recorded within the local area. The closest record of a threatened flora species is approximately 620 metres from the application area. Noting the known ranges of these species and their preferred habitats, including soil and vegetation types, the application area may comprise suitable habitat for three of these species.

Parks and Wildlife advised that the following threatened flora species may occur within the application area (Parks and Wildlife, 2017a):

- *Grevillea curviloba* subsp. *curviloba* (critically endangered): Parks and Wildlife advised that critical habitat for this species includes low-lying sites similar to that identified during DER's site inspection (Parks and Wildlife, 2017a). Parks and Wildlife advised that this species also occurs within occurrences of the 'Shrublands and Woodlands on Muchea Limestone' (Muchea Limestone) TEC at The Vines and in Muchea (Parks and Wildlife, 2017a).
- *Trithuria occidentalis* (critically endangered): Parks and Wildlife advised that this species is known from one population which occurs partly submerged on the edge of shallow, winter-wet claypans within an open heath of *Melaleuca lateritia* (robin redbreast bush) and *Melaleuca viminea* over Herbland of *Rhodanthe pyrethrum*, *Liparophyllum capitatum, Stylidium* sp., C*entrolepis* sp., *Aphelia drummondii*, *Trithuria submersa* and *Trithuria bibracteata* (Parks and Wildlife, 2017a). Parks and Wildlife noted that DER's site inspection found that portions of the application area contain *Melaleuca viminea*, however little information regarding understorey species was noted (Parks and Wildlife, 2017a). Parks and Wildlife advised that this species is unlikely to be found in areas highly infested with weeds but has a higher potential to occur in the less disturbed areas containing *Melaleuca viminea* (Parks and Wildlife, 2017a).
- *Eleocharis keigheryi* (vulnerable): Parks and Wildlife advised that the third species occurs in clay, sandy loam in seasonal claypans and freshwater creeks and wetlands, associated with vegetation that can include *Melaleuca* species (Parks and Wildlife, 2017a). Parks and Wildlife advised that this species could potentially occur within wetland habitats within the application area (Parks and Wildlife, 2017a).

As outlined in Section 2, the 1999 flora and vegetation survey indicates that the application area is likely to include *Acacia saligna* Open to Closed Tall Scrub and *Melaleuca viminea* Open to Closed Tall Scrub (Weston, 1999). The 1999 flora and vegetation survey noted that *Melaleuca viminea-Acacia saligna* Open to Closed Tall Scrub is the habitat and locality where there are several populations of the threatened flora *Grevillea curviloba* subsp. *curviloba* (Weston, 1999).

On review of the 1999 flora and vegetation survey, Parks and Wildlife advised that the objectives, methods and timing of the 1999 flora and vegetation survey are not sufficient to enable confidence in determining the likely presence of threatened flora within the application area. Parks and Wildlife noted that *Trithuria occidentalis* and *Eleocharis keigheryi* would not have been visible at the time of the 1999 flora and vegetation survey as any winter-wet areas would be dry (Parks and Wildlife, 2017a). Parks and Wildlife recommended that a targeted flora survey be undertaken for the rare flora species outlined above (Parks and Wildlife, 2017a).

As outlined under Section 2, in response to DWER's request for further information, the applicant undertook a Level 2 flora and vegetation survey in September 2017. As discussed under Principle (a), no threatened species were located during the 2017 flora and vegetation survey (Bennett, 2017). The 2017 flora and vegetation survey recommended that an additional site visit be undertaken once the water had dispersed to confirm that *Trithuria occidentalis* is not present (Bennett, 2017).

On review of the 2017 flora and vegetation survey, DBCA advised that it is of concern that some portions of the application area were too inundated to record the threatened flora species outlined above, however noted that these species should have been identifiable at the time of the survey using the methods outlined in the survey report (DBCA, 2017a). DBCA advised that from the information provided, it appears unlikely that the above species of threatened flora occur within the application area (DBCA, 2017a).

Given the above, the application area is not likely to include, or be necessary for the continued existence of, threatened flora. The proposed clearing is not likely to be at variance to this Principle.

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

Proposed clearing is not likely to be at variance to this Principle

According to available databases, six TECs have been mapped within the local area. The application area is within the mapped buffers of two of these TECs, being the Muchea Limestone TEC and 'Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)' (Organic Mound Springs) TEC. Approximately 42 per cent (0.31 hectares) of the application area (within the northern and central portions) is mapped as the Banksia Woodlands TEC.

The site inspection found that surface water was present within the application area (DER, 2017). This may indicate a permanent water supply to the application area, and may indicate the presence of suitable habitat for the Organic Mound Springs TEC.

Parks and Wildlife advised that identification of the Muchea Limestone TEC is based on substrates that include sands, clays, sandy loams, and limestone pebbles, rocks or Muchea limestone at depth (Parks and Wildlife, 2017c). Parks and Wildlife advised that the substrate of a nearby occurrence of this TEC is described as limestone outcropping in brown sandy clay / grey sand (Parks and Wildlife, 2017c). Parks and Wildlife advised that, based on DER's site inspection, the Banksia Woodlands TEC is not likely to occur within the application area (Parks and Wildlife 2017c). Notwithstanding, Parks and Wildlife recommended a Level 2 vegetation survey to verify whether any TECs are present, in particular the Muchea Limestone TEC (Parks and Wildlife 2017c).

As outlined under Section 2, in response to DWER's request for further information, the applicant undertook a Level 2 flora and vegetation survey undertaken in September 2017. As discussed under Principle (a), no TECs were located during the flora and vegetation survey (Bennett, 2017). The 2017 flora and vegetation survey infers that the vegetation units present as floristic community types 11 and 4 (Bennett, 2017).

On review of the 2017 flora and vegetation survey, DBCA advised that no statistical analysis was completed, that the methods used to determine the floristic community types is not evident in the report, that the substrate was not visible at the time of survey as it was under water, and that no specific survey appears to have been completed for calcareous floral markers so it is not possible to verify if limestone occurred (DBCA, 2017a). DBCA noted that from the key flora and habitat characteristics outlined in the 2017 flora and vegetation survey, the vegetation units are most likely to be floristic community types 11 and 5, and advised that none of floristic community types 11, 5 or 4 comprises a TEC (DBCA, 2017a). DBCA advised that based on available evidence it appears unlikely that any TECs occur in the wetlands within the application area (DBCA, 2017a).

Given the above, the application area is not likely to comprise the whole or a part of, or be necessary for the maintenance of, a TEC. The proposed clearing is not likely to be at variance to this Principle.

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

Proposed clearing is not likely to be at variance to this Principle

The national objectives and targets for biodiversity conservation in Australia has a target to prevent clearance of ecological communities with an extent below 30 per cent of that present pre-1750, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001). As indicated in Table 1, the remaining extents of native vegetation within the bioregion are above the 30 per cent threshold. Mapped vegetation type Bassendean Complex – North is also above the 30 per cent threshold, however Southern River Complex falls below this level which indicates that this vegetation complex has been extensively cleared. Notwithstanding, the Environmental Protection Authority (EPA) recognises the Perth Metropolitan Region to be a constrained area, within which a minimum 10 per cent representation threshold for ecological communities is recommended (EPA, 2008). Noting that the EPA considers a constrained area to be an area where there is an expectation that development will proceed, and that the application area is zoned 'Urban' in the Perth Metropolitan Region Scheme, the 10 per cent threshold applies in this instance of which the Southern River Complex is above this recommended level.

The local area is estimated to retain approximately 45 per cent native vegetation cover, a large portion of which is contained within conservation areas. On this basis, the application area is not likely to be located within an area that has been extensively cleared.

Noting the extent of development in the local area particularly in close proximity to the application area (refer to Figure 1), the condition of the vegetation within the application area, the presence of suitable habitat for a fauna species of conservation significance, and the presence of a CCW, the application area may be significant as a remnant of native vegetation in the context of surrounding development.

Given the above, while the application area may comprise a significant remnant, primarily due its wetland values, it is not considered to be within an area that has been extensively cleared. The proposed clearing is therefore not likely to be at variance to this Principle.

Table 1: Vegetation extents

	Pre-European (ha)	Current Extent (ha)	Remaining (%)	Current Extent in DBCA-managed Lands (%) (ha)	(%)
IBRA Bioregion					
Swan Coastal Plain	1,501,221	578,432	38.5	38	
Heddle Vegetation Complex					
Southern River Complex within Bioregion	58,781	10,828	18.4	935	1.6
Bassendean Complex – North within Bioregion	79,057	56,575	71.5	30,546	38.6

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

Proposed clearing is at variance to this Principle

As discussed under Principle (a), the majority of the application area is mapped as CCW UFI 15065 'Bordeaux Lane' palusplain (seasonally waterlogged flat) of approximately 35.6 hectares in total area. This CCW palusplain extends to the north and south of Lot 4800 and which has been extensively cleared for residential development (Parks and Wildlife, 2017b). This CCW palusplain is adjacent to CCW UFI 14075 'Tattinger Grove' sumpland (seasonally inundated basin) of approximately 2.25 hectares in total area, and to CCW UFI 15066 'Bordeaux Lane' palusplain of approximately 10.1 hectares in total area (refer to Figure 3).

The site inspection undertaken in May found that there was surface water present on Lot 4800 adjacent to the application area (DER, 2017). The 2017 flora and vegetation survey undertaken in September found that the application area was inundated (Bennett, 2017).

According to available databases, several other wetlands are mapped within the local area, including the following, within one kilometre of the application area:

- 'resource enhancement' wetland (REW) UFI 9179 'Bordeaux Lane' palusplain located approximately 320 metres from the application area;
- 'multiple use' wetland (MUW) palusplain located approximately 590 metres from the application area;
- MUW UFIs 15138, 15788, 15790 and 15791 'The Vines Country Club' sumpland located approximately 620 metres from the application area;
- CCW UFI 8939 palusplain approximately 760 metres from the application area;
- CCW UFI 8794 dampland located approximately 850 metres from the application area;
- REW UFI 14074 sumpland located approximately 850 metres from the application area; and
- CCW UFI 8943 dampland located approximately 870 metres from the application area.

CCWs support a high level of ecological attributes and functions and are the highest priority for preservation, and buffers are designed to protect wetlands from potential impacts while helping to maintain ecological processes and functions within the wetland (Water and Rivers Commission, 2001).

Parks and Wildlife advised that the CCW palusplain within which the majority of the application area is located is identified in the Muchea consanguineous suite (natural wetland group), and that approximately 13.5 per cent of this palusplain area retains values consistent with CCW criteria (Parks and Wildlife, 2017b). Parks and Wildlife advised that in consideration of the extensive development within this CCW palusplain, the application area is likely to retain representative values (Parks and Wildlife, 2017b). Parks and Wildlife also advised that the remnant wetland vegetation within Lot 4800 is likely to be hydrologically and ecologically connected to the wetland vegetation located directly south, and recommended that the cumulative impact of development within The Vines is considered given the majority of this palusplain has been developed in the last 10 years (Parks and Wildlife, 2017b).

The 2017 flora and vegetation survey report suggests that the three areas of wetland vegetation within Lot 4800 should be evaluated as 'resource enhancement' (Bennett, 2017). On review of the 2017 flora and vegetation survey report, DBCA advised that no justification for the evaluation has been provided and it does not appear the evaluation criteria in the draft Parks and Wildlife (2013) *A methodology for the evaluation of specific wetland types on the Swan Coastal Plain, Western Australia* has been applied (DBCA, 2017b). DBCA advised that correct application of the Parks and Wildlife methodology would also require the three areas of wetland vegetation within Lot 4800 to be evaluated as one unit, as the wetland area within Lot 4800 meets criterion 5 in the preliminary evaluation criteria of the Parks and Wildlife methodology (i.e equal to or greater than 90 per cent of the wetland supports vegetation in a 'Good' (Keighery, 1994) or better condition) and would therefore automatically be assigned as 'conservation' category (DBCA, 2017b).

DBCA advised that the observed level of inundation (up to 50 centimetres) as indicated in the 2017 flora and vegetation survey report is not generally expected in palusplain wetlands for any extended length of time, however, urbanisation commonly results in a hydrological change with wetland water levels often increasing (DBCA, 2017b). DBCA also advised that the addition of fill surrounding a wetland changes surface hydrology and in the instance of Lot 4800, has resulted in the creation of a basin where water appears to be accumulating (DBCA, 2017b). DBCA noted that while an increase in wetland water levels may not necessarily be a significant issue for some wetland flora species, increased depth and duration of inundation may result in degradation and death of some vegetation and could impact the capacity for natural regeneration of some species (DBCA, 2017b). DBCA reiterated the recommendation in previous advice that the cumulative impact of development within The Vines be considered (DBCA, 2017b).

DBCA also advised that there is a degree of presumption that areas evaluated as CCW will be protected in planning, as outlined in EPA Guidance Statement No.33 (EPA, 2008) (DBCA, 2018).

Given the above, the proposed clearing will result in the direct loss of vegetation growing in, and in association with, a CCW. The proposed clearing is at variance to Principle.

The CCW is question through a previous Negotiated Planning Solutions would result in this area being lost through development. This action resulted in over 27 hectares of land with significant environmental values transferred to the crown and reserved for conservation to enable the surrounding urban development. The Delegated Officer therefore considers that no further Offset is required for the proposed clearing.

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

Proposed clearing may be at variance to this Principle

As outlined in Section 2, the application area is mapped as the Bassendean, Jandakot Phase system, described as grey sand over pale yellow sands generally underlain by humic and iron podsols (Schoknecht et al., 2004). This system is typically associated *Banksia* spp. low open woodland with a dense shrub layer (Schoknecht et al., 2004). The site inspection identified that the vegetation within the application area does not comprise a *Banksia* spp. low open woodland with a dense shrub layer (DER, 2017).

The Bassendean, Joel Phase system is mapped approximately 80 metres south of the application area. This system is described as poorly drained depressions with humus podzols, and is typically associated with scattered *Melaleuca preissiana*, *Eucalyptus rudis* and *Banksia ilicifolia* (holly-leaved banksia) with a dense shrub layer (Schoknecht et al., 2004). Noting the soils and vegetation types observed during the site inspection (DER, 2017), the application area appears to be more aligned with this system than the mapped system.

The Bassendean, Joel Phase system has been mapped within the land degradation risk categories outlined in Table 2. As indicated in Table 2, greater than 70 per cent of the map unit has a moderate to very high waterlogging risk and a high to extreme phosphorus export risk, and 50-70 per cent of the map unit has a high to extreme water erosion risk and a moderate to high flood risk.

The presence of surface water in autumn suggests that the application area is poorly drained, and that the proposed clearing may increase the risk of waterlogging and phosphorus export. Noting the size, shape and relatively flat topography of the application area, the proposed clearing is unlikely to result in water erosion, or contribute to an increase in flooding.

On the basis of the information in Table 2, the proposed clearing also has the potential to contribute to changes in salinity, however noting the extent of the proposed clearing this impact is expected to be minimal.

Given the above, the proposed clearing may cause appreciable land degradation in the form of increased waterlogging and phosphorus export, and may be at variance to this Principle.

Table 2: Land degradation risk categories (Schoknecht et al., 2004)

Risk categories	Bassendean, Joel Phase system
Wind erosion	10-30% of map unit has a high to extreme wind erosion risk
Water erosion	50-70% of map unit has a high to extreme water erosion risk
Salinity	30-50% of map unit has a moderate to high salinity risk or is presently saline
Flood risk	50-70% of the map unit has a moderate to high flood risk
Water logging	>70% of map unit has a moderate to very high waterlogging risk
Phosphorus export risk	>70% of map unit has a high to extreme phosphorus export risk

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

Proposed clearing is not likely to be at variance to this Principle

According to available databases, the local area contains a number of conservation areas:

- public open space retained as native vegetation is located approximately 40 metres south of the application area, and includes a CCW and is mapped as the Banksia Woodlands TEC;
- public open space retaining patches of native vegetation is located approximately 95 metres west of the application area;
- un-named Nature Reserve (R 49300) / Bush Forever Site 23 is located approximately 340 metres east of the application area, and includes a CCW and is mapped as the Banksia Woodlands TEC;
- Bush Forever Site 22 is located approximately 760 metres from the application area, and includes a CCW and is mapped as the Banksia Woodlands TEC;
- un-named Nature Reserves (R 46875 and R46919) / Bush Forever Site 300 is located approximately 850 metres from the application area, and includes CCWs and is mapped as the Banksia Woodlands TEC;
- privately-managed conservation areas are located approximately one kilometre, 1.2 kilometres and 1.7 kilometres from the application area;
- Bush Forever Site 399 is located approximately 2.9 kilometres from the application area, and is mapped as the Banksia Woodlands TEC; and
- Bush Forever Site 13 is located approximately 3.3 kilometres from the application area, and includes a CCW.

The above conservation areas are separated from the application area by residential development and roads.

Given the above, the proposed clearing is not likely to have an impact on the environmental values of nearby conservation areas. The proposed clearing is not likely to be at variance to this Principle.

(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.

Proposed clearing may be at variance to this Principle

As discussed under Principle (f), several wetlands have been recorded within the local area, including a CCW palusplain within the application area. The site inspection undertaken in May found that there was surface water present outside of the application area, and that the application area contains vegetation consistent with riparian habitats (DER, 2017). The 2017 flora and vegetation survey undertaken in September found that the application area was inundated (Bennett, 2017).

As discussed under Principle (g), the proposed clearing may cause appreciable land degradation in the forms of increased waterlogging and nutrient export. These impacts may affect the quality of surface water within and draining out of the application area, and may impact the hydrological function and environmental values of the CCW located south of the application area. In response, the applicant is of the view that the site comprised of remnant vegetation prior to the site being partially cleared in 2003, 2006 and 2007 (Coterra Environmental, 2019). Through regional scale mapping it is indicated that the groundwater flow direction is easterly and as such this does not indicate there is a groundwater flow between Lot 4800 and the wetland south of the site. Additionally, Mosely Drive is elevated between Lot 4800 and the wetland in the south and as such prevents any surface water flow (Coterra Environmental, 2019).

On review of this information it is acknowledged that there is unlikely to be a connection of surface water flow between Lot 4800 and the wetland south due to the development around these areas. However, as indicated within the DER's site inspection and the 2017 flora and vegetation survey report, Lot 4800 was inundated with water which would suggest that there is a direct relation between groundwater and surface water within Lot 4800. It is also acknowledged that the contour lines indicate that the groundwater flow is in an easterly direction. However, as shown under Figure 3 the wetland within Lot 4800 and the one south of Lot 4800 were once part of a consanguineous suite wetland system and was connected before development. The disturbance and

the creation of urbanisation commonly results in hydrological changes (DBCA, 2017b) and the previous groundwater flow direction in an easterly direction may no longer exist due to the large amount of elevation to the local areas through such development. DWER's assessment remains of the view that there is a possible hydrological connection between the wetland within Lot 4800 and wetland to the south of this area. Detailed hydrological investigations would be necessary to determine to what extent.

Groundwater salinity is mapped between 500-1,000 total dissolved solids (milligrams per litres). Noting the extent of the proposed clearing, the proposed clearing is not likely to contribute to an increase in groundwater salinity or cause deterioration in groundwater quality.

Given the above, the proposed clearing may cause deterioration in the quality of surface water as a result of waterlogging and nutrient export. The proposed clearing may be at variance to this Principle. Noting the fragmented nature of the clearing area, the small amount of clearing and the historical disturbance to the area, it is considered unlikely the proposed clearing will have a significant impact on the quality of surface or underground water.

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

Proposed clearing is not likely to be at variance to this Principle

As discussed under Principle (g), 50-70 per cent of the Bassendean, Joel Phase system map unit has a moderate to high flood risk (Schoknecht et al., 2004). Noting the size, shape and relatively flat topography of the application area, and the extent of development in the surrounding area, the proposed clearing is unlikely to contribute to an increase in flooding.

Given the above, the proposed clearing is not likely to cause, or exacerbate, the incidence or intensity of flooding. The proposed clearing is not likely to be at variance to this Principle.

Planning instruments and other relevant matters.

The application was originally to clear 1.58 hectares of native vegetation within Lot 4800 for the purposes of preliminary works for school construction and bushfire hazard reduction. Supporting information states "*The timing of the vegetation clearing works onsite has been brought forward due to concerns raised by neighbouring residents and the City of Swan in relation to bushfire hazard and risk to surrounding properties*".

The original application was advertised in *The West Australian* newspaper on 18 April 2017 for a 21-day submission period. No public submissions have been received in relation to this application.

No Aboriginal sites of significance are mapped within Lot 4800.

The applicant amended the application area during the assessment to exclude 0.85 hectares of native vegetation within the northern portion of the original application area (indicated by the area shaded green in Figure 2), in accordance with the City of Swan's development approval for the clearing of 0.73 hectares of native vegetation.

State planning context

The Perth Metropolitan Region Scheme Map Sheet 8 shows Lot 4800 to be zoned 'Urban'.

The Western Australian Planning Commission's (WAPC) Policy No. DC 2.4 School Sites states that the Education Department has adopted, as part of a general guide to the desirable size for each type of school, four hectares for a primary school. Lot 4800 is approximately four hectares in area.

Local planning context

The City of Swan Local Planning Scheme No 17 Map 20 shows Lot 4800 to be within a 'Special Use' zone. It is noted that the broader area which contains Lot 4800 (formerly Part Lot 3 / draft Bushplan site 23) was the subject of a negotiated planning solution in 1999, which resulted in the subdivision of Part Lot 3 and the transfer of a 27 hectare portion to the State for inclusion in the Bush Forever estate. The remaining portion was subsequently rezoned 'Urban' and further subdivided.

Lot 4800 is identified for the purpose of a 'Primary School' in the City's approved Outline Development Plan No.37 for The Vines Stage 5 (Woburn Park), which was adopted by the City in 2005 and has had a number of modifications (City of Swan, 2016). As part of the City's initial endorsement of Outline Development Plan No.37 in 2005, the plan identifying the land as a future school was referred to the former Department of Environment (DoE) and the Environmental Protection Authority (EPA) for comment (City of Swan, 2016). Both DoE and the EPA accepted the plan on the basis that a significant portion of the wetland would be retained within the public open space to the south of Lot 4800 (City of Swan, 2016).

On 11 May 2017, DWER received advice from the City stating that it was assessing a development application under its Local Planning Scheme No.17 to clear approximately 1.6 hectares of vegetation on Lot 4800 (City of Swan, 2017a). The City noted that the applicant had advised that the proposed clearing is to prepare Lot 4800 for future development as a private school, as identified in Outline Development Plan No.37 for the area (City of Swan, 2017a). The City advised that in considering the development application, it will have due regard to a number of matters, including the following:

- the likely effect of the development on the natural environment and any means that are proposed to protect or to mitigate impacts on the natural environment;
- whether any trees or other vegetation on the land should be preserved;
- the suitability of the land for the development taking into account the possible risk of soil erosion, land degradation or any other risk; and

- the amenity of the locality, including environmental impacts of the development and the character of the locality (City of Swan, 2017a).

The City advised that it has not yet received a development application for the school, and it is unknown when a development application will be received or how it will be determined (City of Swan, 2017a). The City also advised that while it is to have due regard to Outline Development Plan No.37, which identifies the subject land as being for a school, it is not bound by it when deciding a development application (City of Swan, 2017a). The City advised that the uncertainty around the progress and likely outcome for planning of a school on Lot 4800 raises questions around whether the proposed clearing is premature and/or unwarranted at this time, and as to the state of the land indefinitely if the proposed clearing is approved at this time (City of Swan, 2017a).

The City's Bushfire Hazard Context Plan (dated 21 September 2017) indicates that the whole of the southern portion and approximately one-thirds of the central portion of the application area are within 100 metres of native vegetation within the adjacent public open space, and that the whole of the northern portion of the application area is less than one hectare in size and (if the whole of the central portion is cleared) is located more than 100 metres from other native vegetation (City of Swan, 2018).

At its meeting on 18 October 2017, the City's Council resolved to refuse to grant development approval on the basis that the risk of bushfire associated with the vegetation was not so great as to warrant the loss of visual amenity that would result from the clearing of vegetation, and that the clearing of vegetation ahead of development on the lot would make the land susceptible to increased windblown sand that has the potential to cause nuisance and adversely affect the amenity of surrounding properties (City of Swan, 2017b).

The applicant appealed to the State Administrative Tribunal (SAT) that the application for development approval be reviewed, and provided revisions to the development application for consideration (City of Swan, 2018). The SAT invited the City's Council to reconsider its decision pursuant to section 31 of the *State Administrative Tribunal Act 2004* (City of Swan, 2018).

In reconsidering the City's Council's decision in the context of the applicant's proposed revisions to the development application, the City took into account the following:

- in relation to bushfire risk, the City considered that the vegetation as a whole is approximately 1.58 hectares and is classified as a 'moderate' bushfire hazard under State Planning Policy 3.7 - Planning in Bushfire Prone Areas (SPP3.7), that the hazard level may be reduced to 'low' if the vegetation is cleared to a single area less than one hectare and separated by 100 metres from other vegetation, and that the proposed clearing of the central and southern portions of vegetation on Lot 4800 is acceptable to reduce the bushfire hazard level on the lot to 'low' because these portions are within 100 metres of vegetation within the adjacent public open space, and its location means that retained vegetation would impede future development of buildings and playing fields on the school site inconsistent with the intent of Outline Development Plan No.37;
- in relation to the impact on visual amenity, the City considered that the retention of 0.85 hectares of vegetation along the Ackworth Grange and Althrop Way street boundaries will preserve the visual amenity of the site as viewed from the street consistent with Objective (c) of the Residential zone to preserve the residential amenity of the area;
- in relation to the potential nuisance of windblown sand, the City considered that the retention of 0.85 hectares of vegetation along the Ackworth Grange and Althrop Way street boundaries will reduce the risk of soil destabilisation and resultant dust emissions, and that any development approval should be subject to a condition requiring the applicant to prepare and implement a dust management plan to ensure soil is stabilised to prevent erosion and dust blowing; and
- the City noted that the applicant also proposes to erect four pylon signs, one on each boundary of Lot 4800, to notify the public that a Catholic primary school is planned to be established on the site, in order to reflect that the land is identified as a future school in Outline Development Plan No.37 (City of Swan, 2018).

At its meeting on 14 February 2018, the City's Council resolved to grant development approval for the clearing of 0.73 hectares of native vegetation on Lot 4800, subject to a number of conditions including (among others) that 0.85 hectares of vegetation along the Ackworth Grange and Althrop Way street boundaries is retained (City of Swan, 2018).

The development approval (DA-225/2017) was granted by the City on 19 February 2018 for the stated purpose 'Clearing of Vegetation on Lot 4800 Moselsey Drive, The Vines', subject to conditions which include (among others):

- clearing in accordance with the approved plan, which requires the retention of 0.85 hectares of vegetation along the Ackworth Grange and Althrop Way street boundaries;
- the cleared areas shall be maintained in a low fuel state to the satisfaction of the City;
- rectification of any obstruction, alteration or interference with the natural flow of surface water caused by the approved works;
- prior to commencing the approved works, preparation of a Dust Management Plan and a Landscaping Plan for approval by the City, and subsequent implementation;
- prior to commencing the approved works, undertaking of a fauna survey and relocation of identified fauna to the satisfaction of the City; and
- further approval to be obtained from the City for any additional development on Lot 4800.

The Delegated Officer noted that the development approval has reduced the area available for development on Lot 4800 to 3.15 hectares, less than the minimum area for a primary school identified in WAPC Policy No. DC 2.4. The applicant has been advised that the construction of two story buildings reduces the minimum school size and would then allow the school to still function on a reduced site (Coterra Environmental, 2019).

Having considered the above, the Delegated Officer formed the view that the proposed clearing for the stated purpose of 'preliminary works for school construction' is consistent within the approved City of Swan Outline Development Plan 37 and in accordance with development plan issued by the City of Swan on the 19 February 2018. Regarding the other stated purpose of the clearing permit application, being 'bushfire hazard reduction', the Delegated Officer noted the findings of the City's Council that Lot 4800 is currently classified as a 'moderate' bushfire hazard under State Planning Policy 3.7 - Planning in Bushfire Prone Areas,

and that the bushfire risk associated with a single area less than one hectare separated by 100 metres from other vegetation can be reduced to 'low' bushfire hazard under Policy 3.7.

Impacts associated with proposed development

As discussed under Principle (f), Parks and Wildlife / DBCA advised that the remnant wetland vegetation within Lot 4800 is likely to be hydrologically and ecologically connected to the wetland vegetation located directly south, and recommended that the cumulative impact of development within The Vines is considered as part of this assessment, noting that the majority of this palusplain system has been developed in the last 10 years (Parks and Wildlife, 2017b; DBCA, 2017b).

The proposed construction and ongoing use of a school has the potential to result in impacts to hydrologically and ecologically connected wetlands in the vicinity, including the remnant vegetation located approximately 40 metres south of the application area, which may include or result from:

- groundwater abstraction during school construction;
- disturbance of acid sulphate soils during school construction;
- changes in hydrology (e.g. compaction, creating an impediment to surface water flows, changes in volume of surface water runoff);
- management of pollution (e.g. herbicides/nutrients) in surface water runoff;
- disruption of ecosystem processes (e.g. fauna mortalities);
- changes in social and aesthetic amenity (e.g. as considered by local residents); and
- potential for introduction of additional pressures (e.g. increased risk of fire, uncontrolled access, rubbish dumping, weeds).

Detailed hydrological investigations would be necessary to determine the extent of these impacts. As these impacts are associated with the potential end land use for the site, they are not within the scope of the assessment of the current clearing permit application.

5. Applicant's submission

On 1 September 2017, a DWER Delegated Officer wrote to the applicant, outlining the environmental impacts identified during the assessment of the application, and inviting the applicant to provide additional advice addressing these matters, including information on how the applicant intends to avoid or minimise the impacts identified, and offset any significant residual impacts (DWER ref. A1515420).

DWER officers met with the applicant's representatives on 10 October 2017 to discuss the matters raised in the Delegated Officer's letter. During the meeting, the applicant's representatives provided a flora and vegetation survey conducted in September 2017 (DWER ref. A1670570). The applicant's representatives also provided a detailed planning background relating to the creation and zoning of Lot 4800.

DWER officers again met with the applicant's representatives on 27 February 2018 to discuss the application. During the meeting, the applicant's representatives provided a map of a revised application area consistent with development approval granted by the City of Swan for the clearing of 0.73 hectares of native vegetation on Lot 4800 (refer to Figure 3) (DWER ref. A1637209 and A1637210).

The applicant's additional information was considered in the context of this assessment. It is considered that the proposed clearing in the revised application area will directly impact on native vegetation growing in association with a 'conservation category' wetland, may impact on vegetation with a high level of biodiversity in the context of surrounding development, may impact on habitat for a priority fauna species, and may result in land degradation leading to deterioration in the quality of surface water. It is also considered that the proposed clearing and subsequent land uses are likely to impact on the hydrological and ecological values of a CCW in close proximity to the application area.

On the 29 June 2018, the applicant requested additional time to provide advice on this application. This extension was granted until the 29 August 2018.

On the 20 September 2018, a meeting was had with representatives of the applicant to discuss the matters further. The outcome of the meeting resulted in a further extension given to provide a response

On the 14 December 2018, the applicant requested additional time to provide advice on this application. This extension was granted until 31 January 2019. A reminder was sent to the applicant on 30 January 2019 advising that no further information had been provided and DWER officers attempted to contact the applicant on 31 January 2019 to discuss the expiry of this extension to comment.

On 1 February 2019, the applicant requested additional time to provide advice on this application. This extension was granted until 6 February 2019. On the 7 February 2019, the Delegated Officer then agreed to one final extension of time until 7 March 2019.

On the 4 July 2019, the applicant's representative provided additional information regarding the concerns raised during DWER's correspondence dated 1 June 2018. The additional information provided was in relation to principles (a), (b), (f), (g) and (i). This information has been included, where appropriate, in the above assessment report. The response also provided further evidence in relation to the historical planning associated with the subject site. This has been discussed further under Planning instruments and other relevant matters.

In reviewing the additional information, the Delegated Officer has remained of the view the variance levels against the clearing principles has been assessed in accordance with the *Guide to the Assessment of Application to Clear Native Vegetation under Part V of the Environmental Protection Act 1986* (December 2014) and remains of the opinion that the proposed clearing is at variance to principle (f) and may be at variance to principles (a), (b), (g) and (i). In determining the application, the Delegated

Officer has taking into consideration the planning history of the site and the grant development approval for the clearing of 0.73 hectares issued by the City of Swan. As indicated in the above assessment, the proposed clearing will have significant residual impacts to a CCW, however the Delegated Officer is satisfied that Offsets have already been provided through the previous Negotiated Planning Solutions, which resulted in over 27 hectares of land with significant environmental values transferred to the crown and reserved for conservation to enable the surrounding urban development.

6. References

Bennett, E. (2017) Vegetation and Flora of Lot 4800 Moseley Drive, The Vines. Prepared for Coterra Environment, dated September 2017 (DWER ref. A1670570).

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GIS Databases:

- Aboriginal Sites of Significance
- Acid Sulfate Soil Risk Map, Swan Coastal Plain
- DBCA Managed Estate
- Directory of Important Wetlands
- Groundwater salinity, Statewide
- Hydrography, hierarchy
- Hydrography, linear
- Land Degradation datasets
- NLWRA, Current Extent of Native Vegetation
- SAC Bio Datasets
- Soils, Statewide

- Topographic contours
- Vegetation Complexes SCP
- Wetlands, Swan Coastal Plain

Appendix 3 City of Swan Fire Hazard Reduction Notice

Bush Fires Act 1954

City of Swan

Fire Hazard Reduction Notice (Firebreak Notice)

Notice to Owners and/or Occupiers of land situated within the City of Swan.

To assist in the control of bush fires, and pursuant to Section 33 of the *Bush Fires Act 1954*, all owners and occupiers of land within the City of Swan are required on or before the 1st day of November, 2022, or within 14 days of becoming an owner or occupier of land after that date, must meet the fire hazard reduction conditions described in this notice and maintain these conditions up to and including the 30th day of April, 2023.

1. All land less than 5,000m^2 (0.5 Hectares or 1.2 Acres)

1) Install and maintain an asset protection zone in accordance with the requirements specified in clause 13 of this notice.
2) Maintain all grass to a height of no greater than 10cm.
3) Areas of natural vegetation to be maintained at or below 8 tonnes per hectare.
4) Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in this notice and with any additional requirements outlined within that plan.

2. All land between 5,000m2 and 25,000m2 (0.5 - 2.5 Hectares) or (1.2 - 6.2 Acres)

1) Install and maintain an asset protection zone in accordance with the requirements specified in clause 13 of this notice.
2) Install firebreaks immediately inside and adjacent to all external property boundaries. Firebreaks need to be 3 metres wide with a 4 metre vertical height clearance free from flammable materials and overhanging branches (see section 10 in this notice for further details).
3) Maintain all grass to a height of no greater than 10cm.
   a) If the land is stocked, the grass must be reduced and maintained to a height of no greater than 10cm by the 1st day of December.
4) Natural vegetation within 100 metres of buildings including attached and adjacent structures and essential infrastructure shall be maintained at or below 8 tonnes per hectare, by passive methods of fuel reduction that does not permanently remove or reduce the quantity or occurrence of the native plants, shrubs and trees within the subject area.
5) Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in this notice and with any additional requirements outlined within that plan.

3. All land with an area greater than 25,000m^2 (2.5 Hectares or 6.2 Acres)

1) Install and maintain an asset protection zone in accordance with the requirements specified in clause 13 of this notice.
2) Install firebreaks immediately inside and adjacent to all external property boundaries. Firebreaks need to be 3 metres wide with a 4 metre vertical height clearance free from flammable materials and overhanging branches (see section 10 in this notice for further details).
   a) Properties over 100 hectares require additional firebreaks to divide the land into areas not exceeding 100 hectares.
3) Maintain all grass immediately adjacent to one side of any firebreak to a height of no greater than 10cm and a minimum width of 3 metres.
   a) If the land is stocked, this grass must be reduced and maintained to a height of no greater than 10cm by the 1st day of December.
4) Natural vegetation within 100 metres of buildings including attached and adjacent structures and essential infrastructure shall be maintained at or below 8 tonnes per hectare, by passive methods of fuel reduction that does not permanently remove or reduce the quantity or occurrence of the native plants, shrubs and trees within the subject area.
5) Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in this notice and with any additional requirements outlined within that plan.

4. Plantations

1) Install and maintain external and internal firebreaks, firebreaks that form compartments (cells), firebreaks and hazard reduction measures that protect neighbouring communities and essential infrastructure in accordance with the requirements of a fire management plan approved in writing by the City; or
2) Where no such approved fire management plan exists,
    a) Install and maintain external and internal firebreaks and firebreaks that form compartments (cells), and carry out all other firebreaks and hazard reduction measures which are required in accordance with the requirements and specifications within the Department of Fire & Emergency Services 'Guidelines for Plantation Fire Protection' 2011 or later publication.

5. Application to Vary Firebreak and Hazard Reduction Requirements

1) If it is considered impractical for any reason to clear firebreaks in a manner or location required by this notice, or to carry any fire hazard reduction work or measures required by this notice, you may apply in writing on or before the 1st day of October, for approval to provide firebreaks in alternative positions or to take alternative measures to abate fire hazards on the land. Alternative firebreak application forms can be downloaded from the City of Swan website.
2) If permission is not granted in writing by the City prior to the 1st day of November, you shall comply with the requirements of this notice.
3) When permission for alternative firebreaks or fire hazard reduction measures has been granted, you shall comply with all conditions on the endorsed permit and maintain the land to the required standard throughout the period specified by this notice.
    a) Where a property is affected by an approved bushfire management plan, property owners must comply with any additional requirements and responsibilities outlined within that plan.

6. Fuel Dumps and Depots

Remove all flammable material within 10 metres of fuel dumps, fuel ramps or where fuel drums, whether containing fuel or not, are stored.

7. Hay Stacks

Clear and maintain a firebreak completely surrounding any haystack on the land, within 60 metres of the haystack.

8. Fire Service Access (Strategic Firebreaks)

1) Where under a written agreement with the City, or where depicted on an approved bushfire management plan Fire Service Access are required on the land, you are required to clear and maintain the Fire Service Access a minimum of 6 metres wide along the agreed alignment to provide restricted vehicular access to emergency services and authorised vehicles.
2) Fire Service Access must be free from flammable material and unimpeded by obstructions including boundary fences and gates unless approved in writing by the City.
3) Gates may only be secured with City of Swan Fire Service padlock.
4) Fire Service Access shall be graded to provide a continuous 4 wheel drive trafficable surface a minimum of 4 metres wide with a 1 metre shoulder on either side.
5) All branches must be pruned and obstacles removed to maintain a 4 metre vertical height clearance above the full 6 metre width of the trafficable surface.

9. Emergency Access Ways

1) Where under a written agreement with the City, or where depicted on an approved bushfire management plan, Emergency Access Ways are required on private land, you are required to clear and maintain a vehicular access way to a minimum of 6 metres wide along the agreed alignment.
2) Emergency access ways must be free from flammable material and unimpeded by obstructions including boundary fences and gates unless approved in writing by the City.
3) Gates on Emergency Access Ways must remain unlocked at all times.
4) Emergency Access Ways shall be graded and have suitable drainage to provide a minimum 6 metre wide continuous trafficable surface suitable for all types of 2 wheel drive vehicles.
5) All branches must be pruned and obstacles removed to maintain a 4 metre vertical height clearance above the full 6 metre width of the trafficable surface.

10. Firebreak Construction

1) Firebreaks are to be developed and maintained clear of all obstacles and flammable materials to create a minimum of 3 metres wide trafficable surface suitable for 4 wheel drive vehicles.
2) Overhanging branches must be pruned to provide a 4 metre vertical clearance above the full width of the firebreak surface.
3) Boundary firebreaks must be aligned immediately inside and adjacent to the external property boundaries.
4) Alternative Firebreaks that are approved in writing by the City, or as depicted within a bushfire management plan approved in writing by the City, are to be constructed to the same standard as general firebreaks and must be constructed along the specified alignment.
5) Firebreaks must not terminate in a dead end.
6) Firebreaks may be constructed by ploughing, grading, raking, burning, chemical spraying or any other method that achieves the required standard.

11. Driveways

Where a dwelling is situated more than 70 metres from a public road,

1) Driveways must be maintained clear of all permanent obstacles and flammable materials to create a minimum 3 metre wide trafficable surface suitable for all types of 2 wheel drive vehicles.
2) Overhanging branches must be pruned to provide a 4 metre vertical clearance above the driveway.

12. Fuel Reduction – Natural Vegetation

1) Available bushfire fuels must be maintained at or below:
   a) Asset Protection Zones - 2 tonnes per hectare
   b) Natural Vegetation - 8 tonnes per hectare for areas of natural vegetation within 100 metres of buildings, attached and adjacent structures and essential infrastructure
2) Passive Fuel Reduction within natural vegetation may be achieved by burning, raking, pruning, weed management, removal of dead materials and any other approved method.
3) Permanent removal or partial clearing of natural vegetation including individual or groups of native grasses, shrubs or trees may only be carried out to meet the minimum requirements of this notice.

Note: Advice and resources on how to measure and manage native vegetation fuel loads are available from the Department of Fire and Emergency Services or the City of Swan.

13. Asset Protection Zones Specification

Asset protection zones for habitable buildings and other assets must meet the following requirements:

1) Extends 20 metres out from any external walls of the building, attached structures, or adjacent structures within 6 metres of the habitable building, unless varied under an approved bushfire management plan.
2) On sloping ground the asset protection zone distance shall increase with 1 metre for every degree in slope on the sides of the building/ structure that are exposed to down slope natural vegetation.
3) Asset protection zone requirements only apply within the boundaries of the lot on which the asset is located and cannot be enforced across boundaries.
4) The average fuel loads must be reduced and maintained at two tonnes per hectare or lower.
5) It is recommended asset protection zones predominantly contain vegetation of low-flammability, reticulated lawns and gardens and other non-flammable features.
6) All grass is maintained to or under 10cm.
7) The crowns of trees are to be separated where possible to create a clear separation distance between adjoining or nearby tree crowns. The separation distance between tree crowns should not exceed 10 metres.

   Clearing or thinning existing trees to create distances greater than 10 metres separation between tree crowns within an asset protection zone is not required or supported by this notice and requires approval from the Department of Water and Environmental Regulation and the City of Swan.
8) A small group of trees within close proximity to one another may be treated as one crown provided the combined crowns do not exceed the area of a large or mature crown size for that species.
9) Trees are to be low pruned (or under pruned) to at least a height of 2 metres from ground.
10) No tree, or shrub over 2 metres high is planted within 3 metres of a building, especially adjacent to windows.
11) There are no tree crowns or branches hanging over buildings.
12) Clear and prune scrub to reduce to a sparse density (able to walk through vegetation with relative ease with minimal deviation around trees and shrubs).
13) Install paths or clear flammable or dry vegetation, debris and materials immediately adjacent to the building.

14) Wood piles and flammable materials stored a safe distance from buildings.

Environmental Considerations

Clearing or modifying native vegetation beyond what is required under this notice will require approval from the appropriate Government body and the City of Swan. Please refer to the Department of Water and Environmental Regulation (DWER) and the Department of Fire and Emergency Services (DFES) websites for further information and contact details.

14. Burning

All burning must be carried out in accordance with the relevant provisions of this notice and the *Bush Fires Act 1954*, *Health (Miscellaneous Provisions) Act 1911* and the City's Consolidated Local Laws 2005.

Prohibited Period: All burning, including garden refuse and camping fires are prohibited.

Restricted Period: All burning requires a permit except for the burning of garden refuse and camping fires which are subject to the following conditions:

1) The fire must not be lit if the Fire Danger Rating is High or above, or if a Total Fire Ban is declared.
2) Only one fire is allowed at any time and it does not exceed 1 cubic metre in size.
3) No flammable material within 5 metres of the fire.
4) The fire is only lit between 6 pm and 11 pm and completely extinguished by midnight.
5) At least one person capable of controlling the fire is in attendance at all times with adequate means of extinguishing the fire.

15. Cooking Fires

Fires for the purpose of cooking are exempt from burning period restrictions subject to the following conditions:

1) The fire must not be lit if the Fire Danger Rating is High or above, or if a Total Fire Ban is declared.
2) The fire is contained in a purpose built appliance and
   a) at a person's home; or
   b) an area is set aside for that purpose by the State Authority or City of Swan
3) No flammable material within 5 metres of the fire.
4) At least one person capable of controlling the fire is in attendance at all times with adequate means of extinguishing the fire.

16. Compliance

1) In addition to the requirements of this notice, further works which are considered necessary by an Authorised Officer of the City may be required as specified in writing in a subsequent notice addressed to the land owner.
2) Where the owner or occupier of the land fails or neglects to comply with the requirements of this notice or a subsequent notice addressed to the land owner, the City of Swan may enter onto the land with workmen, contractors, vehicles and machinery to carry out the requisitions of the notice at the expense of the land owner.
3) Failure to comply with this notice and subsequent written notices may result in a penalty not exceeding $5,000, or the issue of a $250 infringement notice and liability for any costs incurred by the City in relation to works undertaken on behalf of the land owner
4) Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in this notice and with any additional requirements outlined within that plan.

17. Definitions

'**Alternative Firebreak**' is a firebreak that is in an alternative position or alignment to the requirement specified in paragraph 2 and 3 of this notice.

'**Alternative Firebreak Application**' is an application that may be made by a land owner to install firebreaks in an alternative position, or to carry out an alternative measures in lieu of general firebreaks.

'**Available Fuel**' is the bush fuel consisting of live and dead vegetation such as stubble, mulch, leaf litter, twigs, trash, scrub and other vegetation less than 6mm in diameter capable of carrying a running fire and will actually burn under prevailing conditions.

'**City**' means the City of Swan.

'**Buildings, Attached and Adjacent Structures**' means habitable buildings that are used as a dwelling, workplace, place of gathering or assembly, a building that is a car park, or a building used for storage or display of goods or produce for sale

by whole sale in accordance with classes 1-9 of the Building Code of Australia. The term building includes attached and adjacent structures like garages, carports verandas or similar roofed structure(s) that are attached to, or within 6 metres of the dwelling or primary building.

'**Asset Protection Zone (APZ)**' is a low fuel area that is reduced of flammable vegetation and materials surrounding buildings and essential infrastructure to minimise the likelihood and impact that direct flame contact, radiant heat or ember attack may have on buildings and assets in the event of a bushfire. This area must extend out from the external walls of a building or asset a minimum of 20 metres.

'**Bushfire Management Plan**' or 'Fire Management Plan' is a comprehensive plan that may be placed on the certificate of title(s) of land that has been developed as a condition of development or subdivision. Bushfire Management Plans may become out dated and it's the responsibility of the property owner to review and keep them current. Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in the Annual Fire Hazard Reduction Notice and with any additional requirements outlined within that plan.

'**Emergency Access Way**' is a two wheel drive trafficable, 6 metre wide access route to provide local residents, general public and emergency services alternative links to road networks at the end of cul- de-sacs or areas where access is limited during an emergency incident.

'**Essential Infrastructure**' or '**Critical Infrastructure**' means assets, infrastructure, systems and networks that provide essential services necessary for social and economic wellbeing and is typically public infrastructure. Assets and infrastructure, usually of a public nature, that generate or distribute electricity, water supply, telecommunications, gas and dams are typical assets that are essential to society and are often located in, or traverse areas that are prone to bushfires.

'**Firebreak**' is an area of land cleared of flammable material (see available fuel above) to minimise the spread of a bushfire and to provide access for firefighting services. For the purpose of this notice the term firebreak is a strip of land at minimum 3 metres with a 4 metres vertical clearance, constructed to provide a 4 wheel drive trafficable surface for access by emergency and authorised vehicles. Boundary firebreaks are installed immediately adjacent the external boundaries of a property.

'**Fire Hazard**' means accumulated fuel (living or dead) such as leaf litter, twigs, trash, bush, dead trees and scrub capable of carrying a running fire, but excludes standing living trees and isolated shrubs.

'**Fire Service Access (Strategic Firebreaks)**' is a firebreak that is 6 metres wide established to provide strategic access and links to road networks whilst providing a wider control/ containment line to protect town sites, estates and similar exposures during bushfire operations.

'**Natural Vegetation**' means natural areas of forest, woodland, shrubland, scrub, mallee or mulga.

'**Passive Fuel Reduction**' means lowering the amount of available fuel that will burn under prevailing conditions by means that will not permanently reduce or modify the structure or life cycle of plant, shrub, scrub or tree communities within an treated area. This is typically achieved by undertaking a cool, controlled burn of an area during cooler, damper months, or by physical removal of built up leaf litter, dead materials, weeds and slashing long dry grasses without damaging live native plants within the area.

'**Plantation**' is any area of native or exotic planted trees that exceeds three hectares in a gazetted town site, or elsewhere a stand of trees of 10 hectares or larger that has been planted and managed intensively for their commercial and environmental value. A plantation includes roads, firebreaks and small areas of native vegetation.

By order of the Council,

Chief Executive Officer

City of Swan

Appendix 4 Flora and Vegetation Survey (BEC, 2017)

VEGETATION AND FLORA
OF
LOT 4800 MOSELEY DRIVE, THE VINES

Prepared for:
Coterra Environment
Level 3,
25 Prowse Street,
West Perth WA 6005

Prepared by:
Dr Eleanor Bennett
PO Box 341
KALAMUNDA 6926

September 2017

STATEMENT OF LIMITATIONS

Scope of Services

This report ("the report") has been prepared in accordance with the scope of services. 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 employer 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 employee 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 Employer 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.

Contents

SUMMARY

Dr Eleanor Bennett undertook a Level 2 botanical survey of Lot 4800 Moseley Drive, The Vines on 14th September 2017. There were three distinct areas of remnant vegetation at the site surrounded by degraded areas. The remnant vegetation as well as some of the degraded area were inundated.

Two vegetation units were recorded from the survey area. These were:

1. Open Forest or Tall Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca rhaphiophylla* with occasional *Melaleuca preissiana* over Sedgeland dominated by *Lepidosperma longitudinale* and *Baumea juncea;* and
2. Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* over Low Shrubland of *Xanthorrhoea preisii* over Sedgeland of *Dielsia stenostachya* over Open Ferns of *Pteridium esculentum.*

Neither of these units are threatened or priority ecological communities.

It was difficult to interpret the vegetation condition of the three remnants due to the inundation, but it was assessed to vary between very good and good. Several weeds were recorded from the remnant bushland but were very dense mainly around the perimeter or each remnant. Rubbish had been dumped in the remnants varying from cans to building supplies.

A total of 30 vascular plant families, 51 genera and 60 taxa were recorded. None of the species were threatened or priority species. Thirty one weeds were recorded of which two, **Gomphocarpus fruticosus* and **Echium plantagineum* are listed as Declared Pest Plants.

No threatened or.priority flora were recorded at the September survey but it is recommended that an additional site visit be undertaken, once the water has dispersed, to confirm that, *Trithuria occidentalis* is not present on site.

1. INTRODUCTION

1.1 Background

Dr Eleanor Bennett was commissioned by Coterra Environment to undertake a Level 2 assessment of Lot 4800 Moseley Drive, The Vines.

Diagram 1. Study area outlined yellow with only the three red areas of dense vegetation nominated to be cleared.

Most of this Lot is cleared of vegetation as visible in Diagram 1 with only three pockets of vegetation remaining. These are labelled areas A, B and C for ease of reference in the report.

1.2 Scope of Works

The requirements for this project were to:

i. Undertake a Level 2 vegetation survey (Environmental Protection Authority and Department of Parks and Wildlife, 2016) of the three nominated areas;
ii. Search for threatened or priority flora in particular three Rare Flora, *Grevillea curviloba* subsp. *curviloba*, *Trithuria occidentalis* and *Eleocharis keigheryi*; and
iii. Determine if the vegetation is a Threatened or Priority Ecological Community.

2. BACKGROUND INFORMATION

2.1 Geology and Landform

The site occurs in the Bassendean Dunes. The Bassendean sand forms a series of dunes of fine to medium grained, poorly sorted quartz sand. These are the oldest of the three dune systems on the Swan Coastal Plain, are thought to be about 800,000 years old and so are the most leached, infertile and acidic. The sands are off-white to grey in colour at the surface and cream to yellow at depth, contain little silt or clay, and very low levels of nutrient elements, any nutrient content being associated with organic matter.

The Bassendean Dunes are separated into three units on the variations in their associated swamps. The Bassendean unit has peaty podzols in the swamps; the Southern River unit has swamps with a claybase; and the Caladenia unit has rounded permanent lakes. The study site occurs in the Southern River unit.

2.2 Vegetation

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 occurs within the Southern River Complex which consists of an Open Woodland of *Corymbia calophylla – Eucalyptus marginata* subsp. *marginata – Banksia* species on the elevated areas and a fringing Woodland of *Eucalyptus rudis* subsp. *rudis – Melaleuca rhaphiophylla* along the streams.

A vegetation survey of the Bushplan Site 33 was undertaken by Weston (1999) when he mapped the different units present across the whole of Site 33. That survey included the current 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, 2017b).

A restricted ecological community which does not meet the criteria for a Threatened Ecological Community 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.

The Department of Parks and Wildlife (2017b) lists Threatened and Priority Ecological Communities recorded for Western Australia but none were listed as occurring in the study area.

Within the adjoining areas the following Threatened Ecological Communities have been recorded:
Communities of Tumulus Springs (Organic mound springs on the Swan Coastal Plain); and
Shrublands and Woodlands on Muchea Limestones.

The communities of the Tumulus Springs have been recorded from Bush Forever Site Number 22 Egerton Mound Spring and Adjacent Bushland, Ellendale which occurs to the south of the survey site. Shrubland and Woodlands of the eastern side of the Swan Coastal Plains may occur in Bush Forever Site 23, Cardinal Drive Bushland, Ellenbrook which is to the north of the survey site.

2.4 Significant Flora

Prior to undertaking the field work a search was undertaken of NatureMap (Department of Parks and Wildlife, 2017d) for a 5 km buffer from the centre at 115°59’17”S and 31°45’37”. This search resulted in the species listed in Table 2.

Table 1. Code and description of Threatened and Priority Flora (Government Gazette of WA (2017) with the threatened species split into their IUCN (2015) categories

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. This category is further subdivided: CE: Flora that are considered likely to become extinct or rare, as critically endangered flora. E: Flora that are considered likely to become extinct or rare, as endangered flora. V: Flora that are considered likely to become extinct or rare, as vulnerable flora.
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.

Code	Declared Rare and Priority Flora Categories
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 Government Gazette of WA (2015).

Table 2. Threatened and Priority Flora Species List recorded in the selected area with W.A. Government Gazette Threatened Flora code and categories and Priority Flora code and categories listed by the Department of Parks and Wildlife (2017a). Description extracted from FloraBase (Western Australian Herbarium, 2017)

Taxon	Code	Description
Threatened Flora		
Caladenia huegelii	CE	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red, Sep to Oct. Grey or brown sand, clay loam.
Eleocharis keigheryi	V	Rhizomatous, clumped perennial, grass-like or herb (sedge), to 0.4 m high. Fl. green, Aug to Nov. Clay, sandy loam. Emergent in freshwater: creeks, claypans.
Grevillea curviloba subsp. *curviloba*	CE	Prostrate to erect shrub, 0.1-2.5 m high. Fl. white-cream, Oct. Grey sand. Winter-wet heath.
Grevillea curviloba subsp. *incurva*	E	Prostrate to erect shrub, 0.1-2.5 m high. Fl. white-cream, Aug to Sep. Sand, sandy loam. Winter-wet heath.
Priority Flora		
Calectasia elegans	P2	No description provided
Millotia tenuifolia var. *laevis*	P2	Ascending to erect annual, herb, 0.02-0.1 m high. Fl. yellow, Sep to Oct. Granite or laterite soils.
Poranthera moorokatta	P2	No description
Cyathochaeta teretifolia	P3	Rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high, to 1.0 m wide. Fl. brown. Grey sand, sandy clay. Swamps, creek edges.
Eryngium pinnatifidum subsp. *Palustre (*G.J. Keighery 13459)	P3	No description provided
Haemodorum loratum	P3	Bulbaceous, perennial, herb, 0.45-1.2(-2) m high. Fl. black/brown-black/green, Nov. Grey or yellow sand, gravel.
Halgania corymbosa	P3	Erect shrub, 0.35-1 m high. Fl. blue-purple, Aug to Nov. Gravelly soils, soils over granite.
Lasiopetalum glutinosum subsp. *glutinosum*	P3	No description provided
Meionectes tenuifolia	P3	No description provided
Phlebocarya pilosissima subsp. *pilosissima*	P3	Shortly rhizomatous, compactly tufted perennial, grass-like or herb, 0.15-0.4 m high. Fl. cream-white, Aug to Oct. White or grey sand, lateritic gravel.
Schoenus capillifolius	P3	Semi-aquatic tufted annual, grass-like or herb (sedge), 0.05 m high. Fl. green, Oct to Nov. Brown mud. Claypans.
Stylidium paludicola	P3	Reed-like perennial, herb, 0.35-1 m high, Fl. pink, Oct to Dec. Peaty sand over clay. Winter wet habitats.
Stylidium trudgenii	P3	Caespitose perennial, herb, 0.05-0.5 m high. Grey sand, dark grey to black sandy peat. Margins of winter-wet swamps, depressions.
Styphelia filifolia	P3	No description provided
Anigozanthos humilis subsp. *chrysanthus*	P4	Rhizomatous, perennial, herb, 0.2-0.4(-0.8) m high. Fl. yellow, Jul to Oct. Grey or yellow sand.
Cyanicula ixioides subsp. *ixioides*	P4	Tuberous, perennial, herb, 0.05-0.15 m high. Fl. yellow, Aug to Oct. Laterite, gravel.
Hydrocotyle lemnoides	P4	Aquatic, floating annual, herb. Fl. purple, Aug to Oct. Swamps.
Hypolaena robusta	P4	Dioecious rhizomatous, perennial, herb, ca 0.5 m high. Fl. Sep to Oct. White sand. Sandplains.

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Trithuria occidentalis was one of the Threatened Flora species that the Department of Water and Environmental Regulation (2017) stated may occur at the site. This was based on the similarity of soil and vegetation types where this species has been located. However when a search of NatureMap was conducted this species was not listed as occurring within a 10 km radius of the site.

3. METHOD

The site was surveyed using the method set out in the Environmental Protection Authority and Department of Parks and Wildlife (2016). Two of the sites Areas (A and B) were inundated so a few transects were walked through the vegetation. As none of the areas was particularly large it was possible to walk around the perimeter to determine any major species or variation in vegetation where present. Temporary 10m x 10m quadrat were set up using a compass and oriented due N,S,E,W to record the variation in the vegetation and associated species. These were recorded with the use of flagging at one corner. The location of the quadrats is shown in Appendix C Map 1. All species, including weeds were recorded. The vegetation, flora, Threatened and Priority Flora surveys were conducted concurrently. For each quadrat, the following were recorded in the field:

- GPS reading (WGS84, equivalent to Geocentric Datum of Australia 1994 (GDA94)) at NW corner;
- Digital photograph taken at the NW corner;
- Soil type;
- Presence, size and type of any outcropping rocks;
- Topography – eg. ridge, upper slope, middle slope, lower slope, drainage line, minor creek, major creek, wetland;
- Vegetation condition using the scale of Keighery (1994) outlined in Table 5;
- Presence of any Threatened or Priority Flora or other significant flora;
- Additional information including dieback, age since fire, predators, erosion, weeds, grazing, tracks etc.; and
- All species were listed together with their percentage cover within the quadrat and average height.

The area outside of each quadrat was also surveyed to record additional (opportunistic) species for that vegetation unit.

The depth of water was a limiting factor as only species with their height above the water could be recorded. It is anticipated that once the area dries additional species would be recorded.

The vegetation units recorded at the site are described using the vegetation classification in Bush Forever (from Government of Western Australia, 2000) as described in Table 3. The vegetation condition also uses that described in Bush Forever (from Keighery, 1994) as in Table. 4.

Table 3. Vegetation Classification (from Government of Western Australia, 2000)

LIFE FORM / HEIGHT CLASS	**Canopy Cover**			
	DENSE 70 % - 100%	**MID DENSE 30% - 70%**	**SPARSE 10% - 30%**	**VERY SPARSE 2% - 10%**
Trees over 30 m Trees 10 – 30 m Trees under 10m	Tall Closed Forest Closed Forest Low Closed Forest	Tall Open Forest Open Forest Low Open Forest	Tall Woodland Woodland Low Woodland	Tall Open Woodland Open Woodland Low Open Woodland
Tree Mallee	Closed Tree Mallee	Tree Mallee	Open Tree Mallee	Very Open Tree Mallee
Shrub Mallee	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs over 2 m Shrubs 1 – 2 m Shrubs under 1m	Closed Tall Scrub Closed Heath Closed Low Heath	Tall Open Scrub Open Heath Open Low Heath	Tall Shrubland Shrubland Low Shrubland	Tall Open Shrubland Open Shrubland Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland

Table 4. 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.

4. RESULTS

A botanical survey was undertaken on 14th September 2017 when transects were walked throughout the remnant vegetation. Areas A and B were flooded up to a depth of over 50 cm, Area C had puddles of water still present. The degraded area between the sites was also flooded varying in depth up to over 35cm. From the aerial photograph (Diagram 1) it is obvious that this area dries out in summer.

A total of four quadrats were surveyed. The locations of these are mapped in Appendix D Map 1, and a full description for each quadrat is provided in Appendix B.

4.1 Vegetation

Two vegetation units were recorded from the survey area:

1 Open Forest or Tall Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca rhaphiophylla* with occasional *Melaleuca preissiana* over Sedgeland dominated by *Lepidosperma longitudinale* and *Baumea juncea.* This was represented by quadrats q1, q2 and q3.

2 Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* over Low Shrubland of *Xanthorrhoea preisii* over Sedgeland of *Dielsia stenostachya* over Open Ferns of *Pteridium esculentum.* This was represented by quadrat q4.

The vegetation units are mapped in Appendix C, Map 2.

The first vegetation unit is inferred to be Floristic Community Type 11 "Wetland forests and woodland" (Gibson et. al., 1994). The second vegetation unit is inferred to be Floristic Community Type 4 "*Melaleuca preissiana* damplands". Neither of these are listed as threatened or priority ecological communities.

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. 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). Table 4 provides the vegetation condition rating and Table 5 the vegetation condition of each of the quadrats.

Table 5. Vegetation Condition Recorded from the quadrats surveyed

Vegetation Condition	Quadrat Number
Good to very good	q1, q2, q3
Good	q4
Degraded	Remainder of the site – already cleared

An accurate assessment of the vegetation condition could not be provided due to the depth of the water. The condition as it appeared at the time of the survey is that recorded. A lot of dumping had occurred in the vegetation, varying from cool drink bottles and cans to building supplies including a quantity of

wood. Once the water is lower the vegetation condition may not be in as such good condition as that recorded in Table 5 due to weed cover and extent of dumping.

The vegetation condition is mapped in Appendix C Map 3.

4.3 Taxa

A total of 30 vascular plant families, 51 genera and 60 taxa (of which 31 were weeds) were recorded during the survey. All species observed are listed under vascular plant families in Appendix A.

4.4 Significant Taxa

No threatened or priority species were located during the survey.

4.5 Weeds

A total of 31 weeds were recorded from the survey area. All have been determined as weeds by the Western Australian Herbarium (2017) and Department of Parks and Wildlife (2017c). 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, invasiveness and current distribution which are shown in Table 8 for each of the non-endemic species recorded. Thirteen of the weeds recorded have a high ecological impact on the natural vegetation.

Weeds that are, or may, become, a problem to agriculture or the environment can be formally classified as Declared Plants under the *Agriculture and Related Resources Protection Act, 1976* (Department of Agriculture and Food, 2017). The Department of Agriculture and Food Western Australia and the Agriculture Protection Board maintain a list of Declared Plants for Western Australia. Two of the weeds, **Gomphocarpus fruticosus* and **Echium plantagineum* are Declared Pest Plant for their ability to invade and pasture and crops.

Table 6. Weeds Recorded From the Site

Species	Common Name	Ecological Impacts	Invasiveness	Current Distribution
		Ecological impact L = low impact species M = medium impact species H=high impact species U = unknown impact	Rate of dispersal R=rapid M=moderate S=slow U=unknown	L = limited (localised) M = moderate H = high E = extensive (widespread) U =unknown
**Acacia iteaphylla*	Flinders Range Wattle	U	M	R
**Acacia longifolia*	Sydney Golden Wattle	H	L	M
**Asparagus asparagoides*	Bridal Creeper	H	R	E
**Briza maxima*	Blowfly Grass	U	R	E
**Carpobrotus edulis*	Hotentot Fig	H	R	M
**Cenchrus clandestinus*	Kikuyu	H	S	H
**Conyza ? sumatrensiss*	Fleabane	M	M	R
**Cynodon dactylon*	Couch	H	R	E
**Cyperus tenuiflorus*	Scaly Sedge	U	H	M
**Echium plantagineum*	Paterson's Curse	H	R	M
**Ehrharta calycina*	Perennial Veldt Grass	H	R	E
**Ehrharta longiflora*	Annual Veldt Grass	H	R	E
**Eragrostis curvula*	African Love Grass	H	R	H
**Euphorbia terracina*	Geraldton Carnation Weed	H	R	H
**Ficus carica*	Edible Fig	H	M	M
**Gomphocarpus fruticosus*	Swan Plant	H	R	H
**Homeria flaccida*	One-leaf Cape Tulip	H	R	H
**Hypochaeris radicata*	Flat Weed	H	R	E
**Juncus acutus*	Sharp Rush	H	R	L
**Lactuca serriola*	Prickly Lettuce	H	R	H
**Lysimachia arvensis*	Pimpernel	U	R	E
**Lythrum hyssopifolia*	Lesser Loosestrife	M	R	E
**Medicago species*	Burr Medic	U	R	E
**Olea europaea*	Olive	M	R	H
**Pelargonium capitatum*	Rose Pelargonium	H	R	E
**Solanum americanum*	Glossy Nightshade	U	R	E
**Sonchus oleraceus*	Common Sowthistle	U	R	E

Species	Common Name	Ecological Impacts	Invasiveness	Current Distribution
**Trifolium* species	Clover	H	U	U
**Typha orientalis*	Bulrush	H	R	M
**Vulpia* species	Fescue	H	R	H
**Zantedeschia aethiopica*	Arum Lily	H	R	E

Twenty one of the weeds listed above are recorded as having a high impact on the environment. However most of the weeds were recorded on the edge of the wetland, rather than in the centre of the wetland.

4.6 Wetlands

The wetland at the site has previously been classified as a conservation category wetland. There are three potential management categories that can be applied to the Swan Coastal Plain. Which are outlined in Table 7.

Table 7. Wetland Management Categories and Objectives for the Swan Coastal Plain (Department of Biodiversity, Conservation and Attraction, 2017)

Management category	General description	Management objectives
Conservation	Wetlands which support a high level of attributes and functions.	**Highest priority wetlands.** Objective is to preserve and protect the existing conservation values of the wetlands through various mechanisms including: • reservation in national parks, crown reserves and State owned land • protection under Environmental Protection Policies • wetland covenanting by landowners. No development or clearing is considered appropriate. These are the most valuable wetlands and any activity that may lead to further loss or degradation is inappropriate.
Resource enhancement	Wetlands which may have been partially modified but still support substantial ecological attributes and functions	**Priority wetlands** Ultimate objective is to manage, restore and protect towards improving their conservation value. These wetlands have the potential to be restored to Conservation category. This can be achieved by restoring wetland function, structure and biodiversity. Protection is recommended through a number of mechanisms.
Multiple use	Wetlands with few remaining important attributes and functions	Use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning through landcare.

Wetlands can be separated into four types on the length of time they are inundated and their position on the landscape as illustrated in Table 8.

Table 8. Wetland Description

	Basin	Flat	Channel	Slope	Highland
Permanently inundated	Lake		River		
Seasonally inundated	Sumpland	Floodplain	Creek		
Intermittent inundation	Playa	Barlkarra	Wadi		
Seasonally waterlogged	Dampland	Palusplain	Trough	Paluslope	Palusmont

The three wetland areas at the site were presumably one large wetland prior to any development occurring in the area. They are sump lands as they occur in a basin below the level of the surrounding area. All would be classed as resource enhancement wetlands as they are all degraded to a certain extent but could with effort be managed to return to conservation status. However each of the three wetlands is small in area and if dumping continues and condition declines they could become multiple

use wetlands. The flooded area that is apparent at the site between the wetland areas would be a floodplain as it is inundated in winter and dry in summer.

The perimeter of this site has been enhanced by planting with native species that occur on sandy soils as the areas surrounding this Lot have been built up for roads etc. At the northern side there was a major difference in height between the plantings on the edge and the wetland enhancing the basin effect of the wetland. Each of the three individual wetlands covered a small area the total area of all three is 1.6ha.

5. DISCUSSION

The site consisted of three remnant wetlands, totalling 1.6ha in area. The three areas were distinct from each other and surrounded by degraded land. When the survey was undertaken on 14th September 2017 the wetlands were inundated and the degraded area between the two northern wetlands was also inundated. This inundation made a final assessment of the species present and the condition of wetland difficult. It is therefore recommended that when the water has receded that a further site visit be under taken.

Two vegetation units were recorded from the survey area:

1 Open Forest or Tall Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca rhaphiophylla* with occasional *Melaleuca preissiana* over Sedgeland dominated by *Lepidosperma longitudinale* and *Baumea juncea; and*

2 Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* over Low Shrubland of *Xanthorrhoea preisii* over Sedgeland of *Dielsia stenostachya* over Open Ferns of *Pteridium esculentum.*

The first vegetation unit is inferred to be Floristic Community Type 11 "Wetland forests and woodland" (Gibson et. al., 1994). The second vegetation unit is inferred to be Floristic Community Type 4 "*Melaleuca preissiana* damplands". Neither of these is listed as a threatened of priority ecological community.

The vegetation condition of the three remnant wetlands varied between very good and good. The surrounding area was degraded.

A total of 30 vascular plant families, 51 genera and 60 taxa were recorded. None of the species were threatened or priority species. Thirty one weeds were recorded of which two, **Gomphocarpus fruticosus* and **Echium plantagineum* are listed as Declared Pest Plants.

It was difficult to interpret the vegetation condition of the three remnants due to the inundation, but it was assessed to vary between very good and good. Several weeds were recorded from the remnant bushland but were very dense mainly around the perimeter or each remnant. Rubbish had been dumped in the remnants varying from cans to building supplies.

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APPENDIX A

Species List

LEGEND

ABBREVIATION	DESCRIPTION
subsp.	subspecies
var.	Variety
*	Weed
sp.	Require additional flowering or fruiting material
?	Unsure if this is the correct genus/species name

Vascular Plant Family	Taxon
AIZOACEAE	**Carpobrotus edulis*
APOCYNACEAE	**Gomphocarpus fruticosus*
ARACEAE	**Zantedeschia aethiopica*
ASPARAGACEAE	**Asparagus asparagoides*
	Lomandra nigricans
	Lomandra preissii
	Sowerbaea laxiflora
ASTERACEAE	**Conyza* ? *sumatrensis*
	**Hypochaeris glabra*
	**Lactuca serriola*
	**Sonchus oleraceus*
BORAGINACEAE	**Echium plantagineum*
CYPERACEAE	*Baumea juncea*
	**Cyperus tenuiflorus*
	Ficinia nodosa
	Lepidosperma longitudinale
	Lepidosperma squamatum
DENNSTAEDTIACEAE	*Pteridium esculentum*
EUPHORBIACEAE	**Euphorbia terracina*
FABACEAE	**Acacia iteaphylla*
	**Acacia longifolia*
	Acacia saligna
	**Medicago* sp.
	Jacksonia sternbergiana
	Kennedia prostrata
	**Trifolium* sp.
GERANIACEAE	**Pelargonium capitatum*
HAEMODORACEAE	*Conostylis aculeata*
IRIDACEAE	**Homeria flaccida*
JUNCACEAE	**Juncus acutus*
	Juncus kraussii subsp. *australiensis*
	Juncus pallidus
LAURACEAE	*Cassytha racemosa*
LOBELIACEAE	*Lobelia anceps*
LYTHRACEAE	**Lythrum hyssopifolia*
MENYANTHACEAE	*Liparophyllum* ? *capitatum*
MORACEAE	**Ficus carica*
MYRTACEAE	*Astartea affinis*
	Eucalyptus marginata subsp. *marginata*
	Eucalyptus rudis subsp. *rudis*
	Hypocalymma angustifolium
	Melaleuca preissiana
	Melaleuca rhaphiophylla
OLEACEAE	**Olea europaea*
ORCHIDACEAE	*Caladenia latifolia*

Vascular Plant Family	Taxon
POACEAE	**Briza maxima*
	**Cenchrus clandestinus*
	**Cynodon dactylon*
	**Ehrharta calycina*
	**Ehrharta longifolia*
	**Eragrostis curvula*
	**Vulpia* sp.
PRIMULACEAE	**Lysimachia arvensis*
PROTEACEAE	*Banksia littoralis*
	Hakea varia
RESTIONACEAE	*Dielsia stenostachya*
SOLANACEAE	**Solanum americanum*
TYPHACEAE	**Typha orientalis*
XANTHORRHOEACEAE	*Xanthorrhoea preissii*
ZAMIACEAE	*Macrozamia riedlei*

APPENDIX B

Quadrat Data

LEGEND

ABBREVIATION	DESCRIPTION
subsp.	subspecies
var.	variety
*	weed
sp.	Require additional flowering or fruiting material
?	Unsure if this is the correct genus/species name

QUADRAT q1

GPS (WGS84): 404271E; 6485775N
Location: Most northern vegetated section on the eastern side
Topography: Wetland
Soil: Possibly black sandy mud
Litter: Unable to assess, all under water
Vegetation Description: Open Forest of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca rhaphiophylla* over Sedgeland of *Lepidosperma longitudinale* and *Baumea juncea*
Vegetation Condition: Good to very good
Notes: Difficult to make an accurate assessment of the species present and vegetation condition as the site was inundated

SPECIES	HEIGHT (cm)	% COVER
Acacia saligna	900	3
Baumea juncea	60	5
Eucalyptus rudis subsp. *rudis*	3000	10
Ficinia nodosa	100	1
Hakea varia	350	4
**Hypochaeris glabra*	20	<1
Juncus kraussii subsp. *australiensis*	70	2

SPECIES	HEIGHT (cm)	% COVER
Lepidosperma longitudinale	70	70
Melaleuca rhaphiophylla	2500	60
**Typha orientalis*	60	<1
Asparagus asparagoides	Opportunistic	
Astartea affinis	Opportunistic	
**Briza maxima*	Opportunistic	
**Cenchrus clandestinus*	Opportunistic	
Conostylis aculeata	Opportunistic	
* *Conyza* ? *sumatrensis*	Opportunistic	
**Cynodon dactylon*	Opportunistic	
**Cyperus tenuiflorus*	Opportunistic	
**Ehrharta longiflora*	Opportunistic	
**Homeria flaccida*	Opportunistic	
Jacksonia sternbergiana	Opportunistic	
Juncus pallidus	Opportunistic	
**Lactuca serriola*	Opportunistic	
Lomandra nigricans	Opportunistic	
**Medicago* sp.	Opportunistic	
**Sonchus oleraceus*	Opportunistic	
Sowerbaea laxiflora	Opportunistic	
**Trifolium* sp.	Opportunistic	
Xanthorrhoea preissii	opportunistic	

QUADRAT q2

GPS (WGS84): 404157E; 6485799E
Location: Most northern vegetated section on the western side
Topography: Wetland
Soil: Possibly black sandy mud
Litter: Unable to assess, all under water
Vegetation Description:. Tall Woodland of *Eucalyptus rudis* subsp. *rudis* over Open Forest of *Melaleuca rhaphiophylla* and *Melaleuca preissiana* over Sedgeland of *Lepidosperma longitudinale* and Grassland of weed species
Vegetation Condition: Good to very good
Notes: Difficult to make an accurate assessment of the species present and vegetation condition as the site was inundated. There were sections of dense weeds on mounds of sand but weeds were dense on the perimeter of the vegetation. This unit included several dead *Banksia littoralis* trees

SPECIES	HEIGHT (cm)	% COVER
**Acacia iteaphylla*	150	1
**Asparagus asparagoides*	twiner	2
Astartea affinis	200	<1
Banksia littoralis	50	<1
**Briza maxima*	50	5
Caladenia latifolia	40	<1

SPECIES	HEIGHT (cm)	% COVER
Cassytha racemosa	twiner	2
* *Conyza* ? *sumatrensis*	50	15
**Ehrharta longifolia*	70	1
Eucalyptus rudis subsp. *rudis*	3000	30
**Ficus carica*	300	4
**Gomphocarpus fruticosus*	200	<1
Juncus kraussii subsp. *australiensis*	150	3
Lepidosperma longitudinale	120	35
**Lysimachia arvensis*	25	<1
Melaleuca preissiana	1500	10
Melaleuca rhaphiophylla	2500	30
**Olea europaea*	100	<1
**Solanum americanum*	100	5
**Sonchus oleraceus*	30	<1
Sowerbaea laxiflora	30	<1
**Vulpia* sp.	30	50
Xanthorrhoea preissii	120	5
Acacia saligna	Opportunistic	
**Cynodon dactylon*	Opportunistic	
Dielsia stenostachya	Opportunistic	
Ficinia nodosa	Opportunistic	
**Juncus acutus*	Opportunistic	
Lobelia anceps	Opportunistic	
**Zantedeschia aethiopica*	Opportunistic	

QUADRAT q3

GPS (WGS84): 404167E; 6485719N
Location: Central vegetated area
Topography: Wetland
Soil: Possibly black sandy mud
Litter: Unable to assess
Vegetation Description:. Open Forest of *Eucalypts rudis* subsp. *rudis* and *Melaleuca rhaphiophylla* over Sedgeland of *Lepidosperma longitudinale*
Vegetation Condition: Good to very good
Notes: On the edge of the unit *Hypocalymma angustifolium* and *Astartea affinis* were common. Quadrat inundated

SPECIES	HEIGHT (cm)	% COVER
Eucalyptus rudis subsp. *rudis*	3000	20
Juncus kraussii subsp. *australiensis*	85	1
Lepidosperma longitudinale	170	75
Liparophyllum ? *capitatum*	30	2
Melaleuca rhaphiophylla	3000	25
Xanthorrhoea preissii	120	5
Acacia saligna	Opportunistic	

SPECIES	HEIGHT (cm)	% COVER
Astartea affinis	Opportunistic	
* *Conyza* ? *sumatrensis*	Opportunistic	
**Cynodon dactylon*	Opportunistic	
**Echium plantagineum*	Opportunistic	
**Eragrostis curvula*	Opportunistic	
Ficinia nodosa	Opportunistic	
**Homeria flaccida*	Opportunistic	
Hypocalymma angustifolium	Opportunistic	
Jacksonia sternbergiana	Opportunistic	
**Juncus acutus*	Opportunistic	
Kennedia prostrata	Opportunistic	
Lomandra nigricans	Opportunistic	
Lomandra preissii	Opportunistic	
**Lythrum hyssopifolia*	Opportunistic	
Melaleuca preissiana	Opportunistic	
**Zantedeschia aethiopicum*	Opportunistic	

QUADRAT q4

GPS (WGS84): 404179E; 6485646N
Location: Southern vegetated area
Topography: Dampland
Soil: Black sandy mud
Litter: Branches 30%; leaves 35%
Vegetation Description:. Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* over Low Shrubland of *Xanthorrhoea preisii* Sedgeland of *Dielsia stenostachya* over Open Ferns of *Pteridium esculentum*
Vegetation Condition: Good
Notes: Scattered areas of standing water only in this area

SPECIES	HEIGHT (cm)	% COVER
**Acacia longifolia*	1000	10
**Asparagus asparagoides*	twiner	3
Astartea affinis	100	3
* *Conyza* ? *sumatrensis*	50	1
Dielsia stenostachya	60	40
Eucalyptus marginata subsp. *marginata*	800	2
Eucalyptus rudis subsp. *rudis*	3000	20
**Ficus carica*	80	2
Hypocalymma angustifolium	60	<1

SPECIES	HEIGHT (cm)	% COVER
Jacksonia sternbergiana	500	15
Lepidosperma longitudinale	200	3
Lepidosperma squamatum	70	5
Macrozamia riedlei	90	1
Melaleuca preissiana	3000	10
**Pelargonium capitatum*	90	2
Pteridium esculentum	200	20
**Solanum americanum*	30	<1
**Sonchus oleraceus*	30	<1
Xanthorrhoea preissii	80	15
Acacia saligna	Opportunistic	
**Carpobrotus edulis*	Opportunistic	
**Cenchrus clandestinus*	Opportunistic	
**Echium plantagineum*	Opportunistic	
**Euphorbia terracina*	Opportunistic	
**Gomphocarpus fruticosus*	Opportunistic	
Juncus kraussii subsp. *australiensis*	Opportunistic	
Melaleuca rhaphiophylla	Opportunistic	
**Vulpia* sp.	Opportunistic	

APPENDIX C

Maps

1. Location of quadrats
2. Vegetation units
3. Vegetation condition

Map 1. Location of quadrats

Map 2. Vegetation units

Abbreviation	Vegetation Description
ErMr	Open Forest or Tall Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca rhaphiophylla* with occasional *Melaleuca preissiana* over Sedgeland dominated by *Lepidosperma longitudinale* and *Baumea juncea.*
ErMp	Woodland of *Eucalyptus rudis* subsp. *rudis* and *Melaleuca preissiana* over Low Shrubland of *Xanthorrhoea preisii* over Sedgeland of *Dielsia stenostachya* over Open Ferns of *Pteridium esculentum.*
Degraded	Cleared of vegetation or dominated by weeds

Map 3. Vegetation condition

Vegetation Condition Rating	Description
3-4	Mainly in very good condition with small areas in good condition
4	Good condition

COTERRA
ENVIRONMENT

Level 1, 98 Colin Street
West Perth WA 6005

T (08) 9381 5513

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