In the matter of:	**an application for review which the Minister for Planning has called-in and decided to determine**
Pursuant to:	**the *Planning and Development Act 2005*, sections 246 and 247**
Formerly:	**State Administrative Tribunal proceeding DR 63 of 2022**
Applicant:	**B & J Catalano Pty Ltd**
Respondent:	**Shire of Harvey**
Relating to:	**a proposed extractive industry Lot 7 Runnymede Road, Wellesley**

RESPONDENT'S OUTLINE OF SUBMISSIONS ON MINISTERIAL APPEAL FORMING PART OF MATERIALS SUBMITTED ON BEHALF OF THE RESPONDENT

Introduction

1. The respondent lodges the following in this review proceeding:

   (1) This submissions document;
   (2) Respondent's Bundle of Documents;
   (3) Witness statement of Elizabeth Edwards; and
   (4) Witness statement of Michael Just.

2. The two witness statements are mainly self-explanatory and are structured in such as a way as to not to require summarising or repetition in these submissions.

3. There are therefore only a couple of matters that merit further explanation in this submissions document. These are set out in the subheadings below.

Desktop environmental response on behalf of respondent in sufficient in the present circumstances

4. The applicant has lodged an application accompanied by the Lundstrom Environment Consultants report of March 2019 based on inspections undertaken in September 2018.

5. As Michael Just's witness statement lodged on behalf of the respondent summarises, the Lundstrom report discloses material which indicates that the appeal site should properly be regarded as forming part of a larger 16 ha 'patch' of Swan Coastal Plain banksia.

6. In these circumstances, there is an onus on the applicant to demonstrate why the application should be approved.

7. The view has been formed that, for the purposes of the respondent's primary case at least (though without prejudice to whatever materials may be thought appropriate by way of reply), it is unnecessary for the respondent to commission its own environmental expert to undertake a full site-review-based investigation. It is sufficient to comment that the applicant's own data as produced in the Lundstrom report, does not demonstrate justification for the approval of the extractive industry, when that data is appropriately analysed against relevant environmental and planning instruments. Accordingly the respondent's materials in its primary case are desktop as regards environmental matters.

8. Also relevant to this decision is that the applicant was potentially going to produce additional environmental reports, and this indeed is exactly the justification that they put forward for their requested extension of time to 18 July 2022. The respondent was always likely to be facing a moving target, and hence it was neither necessary nor appropriate for the respondent to be expected to commission its own full site-review-based investigation. (At one point this was contemplated and commenced but ultimately not pursued for the reasons mentioned).

Carbone Bros Pty Ltd and Shire of Harvey

9. Reliance is placed on this case, as exemplifying, in a particularly-relevant way, the fact that the correct and preferable decision on a development application can be a refusal based solely on environmental grounds. And that is the case, even if the DWER was of a different opinion.

10. In the present case, the DWER has not yet reached an opinion on the environmental acceptability of the extraction, so it is not a case of the Minister being invited to make a decision that is contrary to the opinion of the DWER. But even if that was the case, it would still be open. The following quotations from ***Carbone*** are particularly apposite:

> '66. Seventh, the DWER assessment report is a matter that is relevant to our consideration and one to which we must have due regard, but it is not determinative. We find that in preparing the DWER assessment report, DWER relied on photographs of the application area provided by the applicant to determine the condition of the vegetation. In making our findings on the size, age and health of the Tuart trees we relied on the evidence of experts who had the benefit of visiting the site and were subject to cross-examination under affirmation. Consequently, we observe that the evidence on which we have based our findings on the condition and significance of the Tuart trees to the Tuart TEC is more reliable than the information available to DWER at the time it prepared the DWER assessment report ...
>
> …
>
> 74. Facilitating the extraction of basic raw materials in an environmentally acceptable manner is one of the objectives of the SMBRM Policy. The SMBRM Policy aims to 'encourage the mining of strategic resources in accordance with acceptable environmental standards'.
>
> 75 Clause 5.9 of SPP 2.5 and cl 1.5 of the SMBRM Policy also recognise the need to undertake the extraction of strategic resources in a manner that is environmentally acceptable. They provide:

> 'Identification of strategic resources does not presume that extraction would be environmentally acceptable or that subsequent approval for extraction would be guaranteed. Nor does it remove the requirement of local authorities or proponents to meet their environmental obligations to identify those environmental constraints that may determine the extent and/or manner in which a proposal may be implemented.'

76 Clause 5.9(i) of SPP 2.5 and cl 5.11 of the SMBRM Policy also provide:

> [P]lanning decision-makers are to give due regard to advice from environmental agencies and consider potential impacts on fragmentation and connectivity of remnant vegetation.

77 The applicant contends that the planning framework expressly contemplates the extraction of basic raw materials where environmental degradation is avoided or minimised and can be conducted in accordance with acceptable environmental standards.

…

87 For the reasons that follow, we find that SPP 2.4 and the BRM Guidelines do not alter the policy position with respect to the extraction of basic raw materials where the proposed extraction raises matters that go to the environmental acceptability of the proposal....

88 It is the applicant's position that SPP 2.4 and the BRM Guidelines emphasise the primary role of specialist environmental decision-making agencies in relation to the clearing of native vegetation and that the Tribunal should not undertake a de facto review of the DWER assessment report. The applicant contends that it is not the role of planning authorities to impose conditions that purport to regulate matters otherwise addressed by regulators under other statutory regimes and referred the Tribunal to ***SITA Australia Pty Ltd and Wheatbelt Joint Development Assessment Panel*** [2016] WASAT 22 at [127]-[128] (SITA) which cites ***SITA Australia Pty Ltd v Greater Dandenong City Council*** [2007] VCAT 156; (2007) 150 LGERA 266 at [24]-[33].

89 Whilst we acknowledge that the BRM Guidelines refer to the specialist role of DWER in assessing environmental impacts under Part IV of the EP Act and the issuing of clearing permits under Part V, we observe that the role of the Tribunal is to make findings of fact based on the evidence before it. To do otherwise would be abrogating the Tribunal's statutory function to produce the correct and preferable decision in the de novo review of government decision-making. Further, we find that the decision in SITA can be distinguished from the circumstances of this case because the operation of the PD Act under which an approval is required in relation to the clearing of vegetation is not affected by the clearing provisions of the EP Act or the grant of a clearing permit.

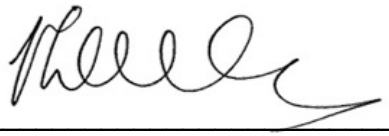
…

109 The relevant planning framework anticipates that the extraction of basic raw materials will occur in an environmentally acceptable manner. Because of the significant ecological value of the Tuart trees, we find that clearing them would be environmentally unacceptable and

inconsistent with the principles of orderly and proper planning....'.

(Underlining indicates added emphasis).

11. As indicated especially in [87] above, the planning framework does not subjugate environmental matters to the public interest in basic raw materials availability. Basic raw materials availability is mainly achieved through attempting to ensure, in the planning framework, that *incompatible uses* do not jeopardise the basic raw materials. Ensuring availability of raw materials is *not* achieved under the planning framework by subjugating environmental considerations.



PL Wittkuhn
Partner
McLeods, Barristers & Solicitors
Solicitors for the Respondent

In the matter of: **an application for review which the Minister for Planning has called-in and decided to determine**

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Respondent: **Shire of Harvey**

Relating to: **a proposed extractive industry Lot 7 Runnymede Road, Wellesley**

RESPONDENT'S BUNDLE OF DOCUMENTS FORMING PART OF MATERIALS SUBMITTED ON BEHALF OF THE RESPONDENT

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5A.	Greater Bunbury Region Scheme Map Sheet 9	16 June 2022	182
6.	Extracts of Local Planning Strategy	22 April 2020	183 -191
7.	Approved Conservation Advice for Banksia Woodlands under EPBC Act	16 September 2016	192 – 236
8.	Declaration of endangered fauna EPBC Act	11 July 2000	237 – 269
9.	Extracts from *Environment Protection and Biodiversity Conservation Act 1999* (Cth)	Current	270 - 285
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20.	WAPC approval to Commissioner of Main Roads for extractive industry on Lot 21 Runneymede Road, Wellesley	23 December 2021	456 - 461

B&J Catalano
South Western Highway
Brunswick Junction
W.A 6224
Ph: (08) 9726 8100
Fax (08) 9726 1575

EXTRACTIVE INDUSTRY LICENCE APPLICATION
&
ENVIRONMENTAL MANAGEMENT PLAN (EMP)

LOT 7 ON DIAGRAM 40591
RUNNYMEDE ROAD, WELLESLEY

September 2021

Extractive Industries Licence Application and Environmental Management Plan

LOT 7 RUNNYMEDE ROAD, WELLESLEY

REPORT PREPARED BY
LUNDSTROM ENVIRONMENTAL CONSULTANTS PTY LTD

Lot 7 on Diagram 40591

Runnymede Road, Wellesley

Shire of Harvey

Extractive Industries Licence Application and Environmental Management Plan

Version Reference: 0.1

Date: September 2021

Prepared by Lundstrom Environmental Consultants Pty Ltd for B&J Catalano Pty Ltd

Lundstrom Environmental Consultants Pty Ltd

Telephone: 08 9310 3297

Email: mike@lundstrom-environmental.com.au

Web: https://www.lundstrom-environmental.com.au

B&J Catalano Pty Ltd

Telephone: 08 9726 8100

Email: peterbennett@catalano.com.au

Web: http://www.catalano.com.au/

Version Register

Version No.	Description	Author	Reviewed by	Date
0.1	Final	B. Ekanaike	V. Pez	September 2021

Front cover image: *Nearmap Image of property December 2019*

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Appendix 4: Water Management Plan

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Appendix 6: Dieback Management Plan

1 INTRODUCTION

The purpose of this report is to provide all the necessary information in support of an extractive industries licence (EIL) amendment application by the Proponent, B & J Catalano Pty Ltd. Information contained in this report is also aimed at fulfilling the requirements for Development Approval (DA). The DA application form is included with this report as Appendix 1.

This report describes the past operations and sets out the details of the proposed new sand mining on the property together with maps. It also provides an environmental assessment of the proposal and environmental management plans.

2 PROPERTY DESCRIPTION, OWNERSHIP AND LOCALITY

The property is situated approximately 2km to the east of Forrest Hwy, 23km north of Bunbury. A locality plan is included as Figure 1. The property description and ownership are summarised in Table 1.

Table 1. Property description

Property Description:	Lot 7 on Diagram 40591 Runnymede Road, Wellesley Shire of Harvey
Volume	1358
Folio	260
Area:	80.19 ha
Ownership	B, C & S Catalano

3 DESCRIPTION OF THE SITE AND ITS SURROUNDS

3.1 PRESENT LAND USE

The property is currently used for sand extraction. Lot 4 adjoining it to the south is also operated by B&J Catalano for sand extraction. Main Roads proposes to establish a sand quarry on Lot 21 adjoining the property to the north. Other properties surrounding the proposed operation are mainly used for grazing. Figure 2 illustrates the land use patterns of the immediate surrounds.

3.2 TOPOGRAPHY, DRAINAGE AND WETLANDS

Lot 7 has natural elevations ranging between approximately 12 and 52mAHD. There is an existing pit on the property with a proposed final, rehabilitated pit floor elevation of 9mAHD and batters of 1:6 (Figure 3). The new extraction area is located immediately to the east of the existing pit and slopes gently from 33mAHD in the east to 25mAHD in the west (Figure 3).

There are no defined drainage lines within the proposed extraction area as drainage occurs by infiltration into the porous sand surface. Runoff is unlikely to be generated by heavy winter rainfalls due to the porous nature of the surface and low slopes within the extraction area.

A dampland wetland (Myalup Swamp) is located to the west of property, approximately 670 metres from the proposed EIL area. The management category for most of this wetland is classified as Multiple Use but a small portion of the wetland, 1.78km from the proposed operations, is classified as Conservation. There is also a dampland Conservation wetland, approximately 1.2km to the east of the new EIL area (Landgate 2020).

No Conservation or ANCA or RAMSAR wetlands exist within 1,000 metres of the proposed extraction areas (Landgate 2020 and WALGA 2020).

The site does not fall within a RIWI Surface Water Proclamation Area (Landgate 2020).

3.3 GEOLOGY AND SOILS

The entire property is covered by grey and yellow sands of the Spearwood System comprising mainly dunes and dune ridges. The sand reaches a maximum thickness of 20 metres and is underlain by sandy clays of the Guildford Formation and limestone of the Tamala Formation.

3.4 GROUNDWATER HYDROLOGY

Based on an evaluation of information provided by the Department of Water and Environmental Regulation (DWER), together with data on static water elevation obtained from nearby private bores the maximum groundwater level at Lot 7 is estimated to be approximately 8.14mAHD beneath the old EIL area batter and approximately 10.14mAHD at the eastern boundary of the new EIL area. Groundwater flow is towards the Myalup Swamp to the west.

3.5 VEGETATION

The eastern half of the property is located in an area mapped as Heddle Vegetation Complex - Bassendean Complex-Central and South. It is described as vegetation ranging from woodland of *Eucalyptus marginata* (jarrah) – *Allocasuarina. fraseriana* (sheoak) – *Banksia spp.* to low woodland of *Melaleuca spp.* and sedgelands on the moister sites. (WALGA 2020).

The western half of the property lies in an area mapped as Karrakatta Complex-Central and South. It is described as predominantly open forest of *E. gomphocephala – E. marginata- E. calophylla* (tuart-jarrah-marri) and woodland of *E. marginata – Banksia spp.* (WALGA 2020).

A Southwest Regional Ecological Linkage axis line runs through the remnant vegetation in the middle of the property. The proposal is unlikely to affect this ecological linkage.

The proposed extension EIL area comprises of remnant native vegetation for which a clearing permit of 0.88ha will be applied for with Department of Water and Environmental Regulation (DWER). A Flora and Vegetation Survey undertaken by Lundstrom Environmental Consultants (LEC) in September 2018 over a 16ha area included the proposed extension EIL area. The survey found one vegetation type was described and mapped within the Survey Area: *Banksia attenuata - Eucalyptus marginata* open woodland over a *Hibbertia hypericoides – Melaleuca thymoides* low open shrubland over a herbland of *Dasypogon bromeliifolius*, which is consistent with the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed Banksia Woodlands Threatened Ecological Community (TEC). No Threatened flora under the *Biodiversity Conservation Act 2016* (BC Act) or under the EPBC Act were recorded, however three Priority flora were recorded in the Survey Area: Acacia semitrullata (P4); Millotia tenuifolia ?var. laevis (P2); and Lasiopetalum ?membranaceum (P3). None of the priority species were located near the proposed extension EIL area.

The vegetation of the Survey Area ranged from 'Excellent' to 'Degraded', with the majority of the survey site in an 'Excellent' condition, however the proposed extension EIL area was mapped predominantly as Completely Degraded to Good.

3.6 FAUNA

The EIL area is within a 'Possible' breeding area buffer, possible feeding habitat and a 'Confirmed' roosting area buffer for the threatened Carnaby's black cockatoo (*Calyptorhynchus latorostris*) (Landgate 2021).

The EIL area also contains potential for medium suitability habitat for the threatened western ringtail possum (*Pseudocheirus occidentalis*) (Landgate 2021).

A fauna survey will be conducted within the proposed area to be cleared and submitted to DWER as a part of the clearing permit application.

3.7 ENVIRONMENTALLY SENSITIVE AREAS

An Environmentally Sensitive Area (ESA) is an area where the vegetation has high conservation value and cannot be cleared. ESAs are declared by the Minister in the Environmental Protection (Environmentally Sensitive Areas) Notice 55 (2005) under section 51B of the Environmental Protection Act 1986. There are no Environmentally Sensitive Areas (ESA) as defined by the Clearing Regulations (DWER) within the proposed EIL area. The closest ESA is the dampland Conservation wetland, approximately 1.1km to the east of the new EIL area (WALGA 2020).

3.8 CURRENT ZONING

The area is zoned as "General Farming" in terms of the Shire of Harvey Town Planning Scheme No. 1 and "Rural" in terms of the Greater Bunbury Region Scheme.

3.9 BUSHFIRE PRONE AREAS

Most of the property including the new EIL area falls within a bushfire prone area as designated by the Fire and Emergency Services (FES) Commissioner on 30 July 2019 (Figure 2). However, the threat of bushfire from this operation is considered low and no habitable building, or any other structure, is to be developed.

3.10 CLOSEST RESIDENCES

The closest residences to the outer boundaries of the extraction areas are identified in Table 2 and mapped on Figure 2.

The Environmental Protection Authority (EPA) draft Environmental Assessment Guidelines "Separation distances between Industrial and sensitive land uses" lists the generic buffer for extractive industries grinding and milling works but no blasting as 500-1,000m depending on the type of processing. As this operation would be a "low scale" sand operation with no crushing and thus quieter than other extractive resources such as gravel, the minimum generic buffer would be likely to apply.

There are 3 residential sites within 1,000m of the new extraction areas (measured from the closest point), they are all at least 500m from the closest boundary of the extraction area.

Table 2. Residential Dwellings within 1,000m of the extraction area

Reference No. on Figure 2	Lot No.	Occupants Name	Distance to closest area of pit (metres)
Res 1	101	G.P. Reading	850
Res 2	111	P. W Ivankovich – listed as owner but not sure if occupier	845
Res 3	22	LandCorp	500

Potential impacts on surrounding residents are discussed further in Sections 5.7 and 5.8.

4 THE DEVELOPMENT PROPOSAL

4.1 PREVIOUS SAND EXTRACTION

There are two existing approvals for Lot 7: The existing original EIL area; and the recently approved EIL area to the east of the existing EIL area (Figure 3).

The current EIL and PC for the existing EIL area was granted on 29 September 2017 and 11 April 2017, respectively. Both will expire on 11 April 2022. This licence is for 120,000m^3 of sand to be undertaken in three equal stages, covering a total area of 15.61ha, as shown in Figure 3. Approximately a third of the extraction area (Stages 1 and 2) has had topsoil stripped and stockpiled and extraction has commenced in an area of approximately 9ha in the western part. It is estimated that approximately 40,000m^3 of sand has been extracted to date. It is estimated that the existing approved resource has 80,000m^3 of resource remaining.

The recently approved EIL area to the east of the existing EIL area had DA granted on 10 September 2020 and EIL granted on 19 July 2021, with expiry on 10 September 2025 and 19 July 2026 respectively. This licence is for 160,000m^3 of sand to be extracted from an additional area of 1.97ha, as shown in Figure 3.

This situation is made possible by the fact that a sand pit is soon to be extracted by Main Roads WA, on Lot 21 to the north. The final land surface between the two Lots will thus not contain a batter on either side as shown on Figure 4.

A summary of all approvals for Lot 7 Runnymede Road is provided in Tables 3 and 4.

Table 3. Shire of Harvey Regulatory Instruments

Approval	Date of Issue	Description	Expiry	Status
Shire of Harvey Planning Consent (ref: 10/57708) (A002575)	19/12/2011	3 stages with combined area of 15.8ha	18/12/2016	Renewed
EIL (A002575/EX/001)	15/10/2013	Lot 7, 15.8ha	06/12/2016	Renewed
EPBC Approval (2011/5996)	18/11/2011	Lot 7	14/11/2017	Expired
Shire of Harvey Development Approval (ref: 16/39708)(A2575/EX/002)	11/04/2017	Lot 7, 15.6ha	10/04/2022	Current
EIL (A002575/EX/002)	29/09/2017	Lot 7, 15.6ha	11/04/2022	Current
Shire of Harvey Development Approval (A2575/EX/003) (20/12768)	10/09/2020	Lot 7, additional area of 1.97ha	10/09/2025	Current
EIL (A002575/EX/003)	19/07/2021	Lot 7, additional area of 1.97ha	19/07/2026	Current

Table 4. Permits to Clear Native Vegetation

Approval	Date of Issue	Description	Duration of Permit	Status
CPS 5480/1	21/03/2013	Lot7, 2.86ha	12 April 2013 – 12 April 2023	Current
CPS 8916/1	11/08/2021	Lot 7, 1.97ha	03 September 2021 – 03 September 2031	Current

4.2 PROPOSED SAND EXTRACTION

B&J Catalano propose to extract a total of approximately 70,000m^3 of sand from an additional area of 1.17ha immediately to the east of the original pit, and to the south of the recently approved EIL area, as shown in Figure 3.

The proposed Stage 4 will combine the recently approved EIL area and the new proposed extension EIL area. The total extraction area of Stage 4 will be 3.13ha, resulting in a combined resource of approximately 195,000m^3.

The above resource plus the batters (~90,000m^3) will bring the total resource from this approval to 285,000m^3, and with approximately 80,000m^3 remaining from the existing EIL area, the total Lot 7 resource is estimated as 365,000m^3. Annual extraction will be approximately 70,000m^3 per annum, this may vary depending on the demand for sand.

Proposed mining actions are as follows:

- The active area will be stripped of topsoil, which will be placed in stockpiles within the extraction area.
- Within the active cell, sand will be excavated using a front-end loader and bulldozer. Trucks will enter the pit from via Runnymede Road to be loaded from the stockpile by a front-end loader.
- The depth of the excavation within the new EIL area is constrained by the fact that the entire area needs to serve as a batter to the Main Roads pit on Lot 21. Excavation will only proceed until a minimum of approximately 10m AHD is reached in the northwestern corner of Stage 4. The final landsurface will slope upwards to the north-eastern corner which will have final elevation of approximately 33m AHD (Figure 4).
- Stage 4 (comprising both recently approved and proposed extension EIL areas) land surface rehabilitation will be undertaken in line with the rehabilitation commitments outlined in the Pit Rehabilitation and Maintenance Management Plan attached as Appendix 2.
- Batters of 1:6 (vertical: horizontal) will be achieved at the completion of landsurface rehabilitation, with the whole area (Stage 4) rehabilitated to pastures.

Table 5 describes past operations undertaken on Lot 7 since 2017 and the proposed actions that will be taken by B&J Catalano over the next 5 years.

Table 5. Stages of the Mining Operation

Stage	Action	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
PAST OPERATIONS											
1	Remove topsoil and stockpile										
1	Extract sand by loader & truck										
2	Remove topsoil and stockpile										
2	Extract sand by loader & truck										
3	Remove topsoil and stockpile										
3	Extract sand by loader & truck										
1	Rehabilitate Stage 1										
2	Rehabilitate Stage 2										
3	Rehabilitate Stage 3										
Infill planting	2.28ha native vegetation										
Revegetation	2.61ha native vegetation										
PROPOSED OPERATIONS											
New Extraction Area (Stage 4) and Existing Pit Batter	Clearing of approx. 10 trees within approved footprint										
	Clearing of approx. 0.88ha within proposed footprint										
	Remove topsoil and stockpile										
	Extract sand by loader & truck										
	Rehabilitate Stage 4										

4.3 SITE ACCESS AND EGRESS ROADS

Access to the site will be obtained via Runnymede Road, with the use of a shared access drive along the northern boundary of Lot 4. Runnymede Road has been sealed and maintained by B&J Catalano for this purpose.

4.4 ESTIMATED TRAFFIC TO BE GENERATED

The following estimates are made:

- Total annual sand removal: 70,000 m^3
- Number of working days per month: 24 days
- Vehicle payloads (GAV's): Standard rigid truck (14 tonnes)
  Single Semi-loader (24 tonnes)
- Proportional use: 14 tonners (50%), 24 tonners (50%)

The above factors suggest an average of 27 truck movements per day from all Lot 7 operations, but this will be dependent on demand. Operating times will be Monday to Saturday, 6.30am to 6.00pm excluding public holidays.

5 POTENTIAL NEGATIVE ENVIRONMENTAL IMPACTS AND PROPOSED MANAGEMENT

Short term negative environmental impacts are to be expected in the process of all mining actions. However, these can largely be mitigated over the medium to long term provided that operating procedures are in accordance with acceptable standards and that rehabilitation measures are implemented as proposed. The following listed potential impacts are used as a check list to ensure that all potential major impacts are addressed.

5.1 FLORA AND FAUNA

A large portion of the property has already been cleared. The recently approved EIL area involves the clearing of approximately 10 paddock trees, which has already been approved by DWER. Catalano proposes to clear a further 0.88ha of vegetation, for which a clearing permit will be submitted. Since no significant clearing of native vegetation is proposed, impacts on native flora and fauna will be limited. The area will be returned to pastures once extraction is completed.

5.2 WEEDS

B&J Catalano will implement a weed management plan as is described in Appendix 3 of this report.

5.3 ALTERATION OF THE LAND SURFACE

No steep slopes will remain after mining, and this will ensure that the extraction area will blend into the surrounding landscape. The proposed final land surface has been illustrated in Figure 4.

5.4 VISUAL IMPACT

The proposed extraction is not in a visually sensitive area and it is unlikely that problems will be encountered from this source. The site is well screened with dense infill planting along the western boundary and the western boundary of Lot 4 also has 40m of vegetation planted along the roadside, providing adequate screening of the operations.

5.5 WATER

5.5.1 Potential Impacts

In all mining operations the potential exists for impacts to be incurred on surrounding water resources, or by storm water erosion of exposed areas. This is dependent on the slopes associated with the site, the nature of the ground materials and the proximity of the site to sensitive receptors such as productive aquifers, wetlands, lakes or rivers.

Management measures to mitigate potential impacts to or from water are contained in the Water Management Plan included as Appendix 4 and are summarised below.

5.5.2 Water Management

5.5.2.1 Surface Management

Due to the very high permeability of the sand being excavated, it is unlikely that damage from storm water runoff will occur.

5.5.2.2 Stormwater Management

Due to the very permeable nature of the sand within the operational area, it is unlikely that any expression of surface water will exist, even after heavy winter rains.

5.5.2.3 Ground Water Management

No groundwater will be exposed since the floor of the pit will be more than 0.3m above the estimated maximum water table level. The final land surface will be at least 0.5m above the estimated maximum water table level.

Due to the low scale nature of the operations, no groundwater contamination is anticipated. No fuel or lubricant storage will occur on the site. Refuelling will take place using a mobile refuelling vehicle which is equipped with a "snap-on snap-off, fast-fill and auto shut-off" facility. Plant will be refuelled each morning, leaving the vehicles almost empty overnight. No major servicing, which could lead to fuel and oil spills, will take place on the site. Minor spills which may occur occasionally will be neutralised by soil processes.

5.6 ACID SULFATE SOILS

A search of the CSIRO's Australian Soil Resource Information System (ASRIS) database identified the probability of acid sulfate soils occurring within the proposed EIL area as extremely low/confidence unknown (CSIRO, 2020).

A low probability of ASS within the EIL area is likely because the material to be excavated is deep Spearwood sands with rapid drainage characteristics. There are no remnant swampy sediments within the extraction area where acid sulphate soils might be exposed or activated as a result of the proposed extraction activities. The extraction will remain above the water table at all times.

5.7 NOISE

The majority of the noise related to the operations will be generated by a loader and the haulage trucks. The closest residence is approximately 500 metres from the nearest point of the extractive operations. Operations will be undertaken approximately 10 metres below natural ground level and topsoil stockpiles will be used as additional noise buffers. In addition, there is dense vegetation which surrounds the proposed pit area, and this will also serve to buffer any noise generated.

There have been no noise complaints from the existing operations on Lot 7 or the operations on the adjoining Lot 4 sand extraction operations, which have been in operation for many years. A contact number for complaints for both Lots is advertised on the site notice board at the entrance to the property.

5.8 DUST

The proposed sand extraction may emit dust to the atmosphere from the following activities:

- Removing topsoil.
- Excavation of sand
- Loading of haulage trucks.
- Trafficking on unsealed surfaces.

The closest resident is approximately 500 metres from the boundary of the extractive operations. Measures that will be undertaken to control and minimise impacts of dust are discussed in a Dust Management Plan, which is included as Appendix 5.

5.9 DIEBACK

5.9.1 Potential Impacts

No obvious signs of dieback infestation were observed in the uncleared vegetation within the proposed extraction area. Since the vegetation adjacent to the proposed extraction area was found to be banksia dominated vegetation and appeared in good to excellent condition (LEC Flora and Vegetation Survey 2018), it is likely to be dieback free. On the basis of this, the site should be classified as dieback free and managed as such. Guidelines for the management of the pit and the movement of vehicles in and out of the pit are contained in the Dieback Working Group guideline document (Dieback Working Group 2010).

5.9.2 Dieback Management

A Dieback Management Plan (DMP) has been included as Appendix 6, the DMP describes the measures that will be taken to limit the risk of spread of Dieback disease as a result of sand extraction, and includes the following management measures:

- The property will be fenced at all times.
- Access to the property will be via a single entrance gate.
- All machinery, trucks and other vehicles will arrive in a clean condition free of soil and organic matter that may contain dieback fungus.
- Any soil and plant material brought to the site for rehabilitation purposes should be from dieback free sources.
- The site will not be worked during wet periods.
- Employees and contractors working on the site will be informed of the purpose of the above measures and their responsibilities in relation to dieback prevention.

5.10 HERITAGE SITES

A search of the Department of Planning, Lands and Heritage (DPLH) Aboriginal Heritage Inquiry System (AHIS) shows no registered sites or other heritage places within Lot 7 (DPLH 2020). The closest sites of significance (Site No. 5806 & 5805) are located within the south-western corner of Lot 4. An archaeological survey of Lot 4 undertaken in 2008 confirmed that there was a low probability of heritage materials being found during extraction. If during the works, an Aboriginal cultural heritage site is discovered, the Proponent will immediately advise the Department of Aboriginal Affairs and abide by the *Aboriginal Heritage Act 1972*.

6 REFERENCES

CSIRO (2020). Australian Soil Resource Information System (ASRIS). [Online], http://www.asris.csiro.au. Accessed January 2020.

Department of Planning, Lands and Heritage (DPLH) (2019). Aboriginal Heritage Inquiry System (AHIS). [Online], https://maps.daa.wa.gov.au/AHIS/. Accessed January 2020.

Dieback Working Group (2010). Management of Phytophthora Dieback in Extractive Industries. Best Practice Guidelines. Available on http://www.dec.wa.gov.au

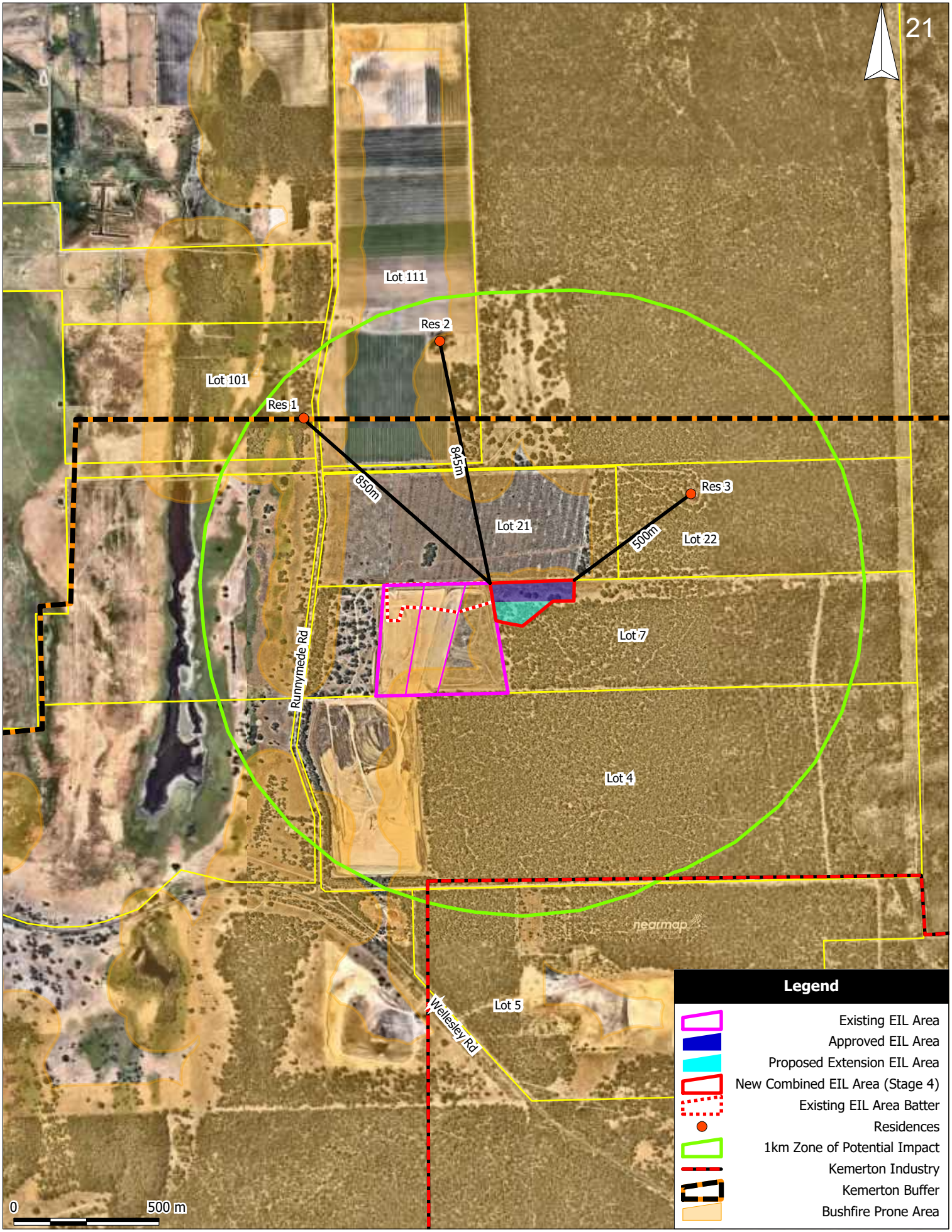
Landgate (2020). Locate V5. [Online] https://maps.slip.wa.gov.au/landgate/locate/. . Accessed January 2020.

WALGA (2020). Environmental Planning Tool (EPT). [Online], http://lbp.asn.au/index_public.html. Accessed January 2020.

FIGURES

Lundstrom Environmental Consultants Pty Ltd Leeming WA 6149 Mob: 0417934863 mikelund1@bigpond.com	Scale: 1:220000 Original Size: A4 Datum: GDA94 Projection: Australia MGA94 (50)	Client: B & J Catalano Project: Sand Extraction Location: Lot 7 Runnymede Road Wellesley	**Figure 1:** **Locality Plan**

\\lecserver\DATA\Catalano\Runnymede Rd Lots 4 & 7_Wellesley_SoH_Sand\Lot 7 Runnymede Rd\2020 Application\Drawings\F1 Locality Map.map 22/01/2020



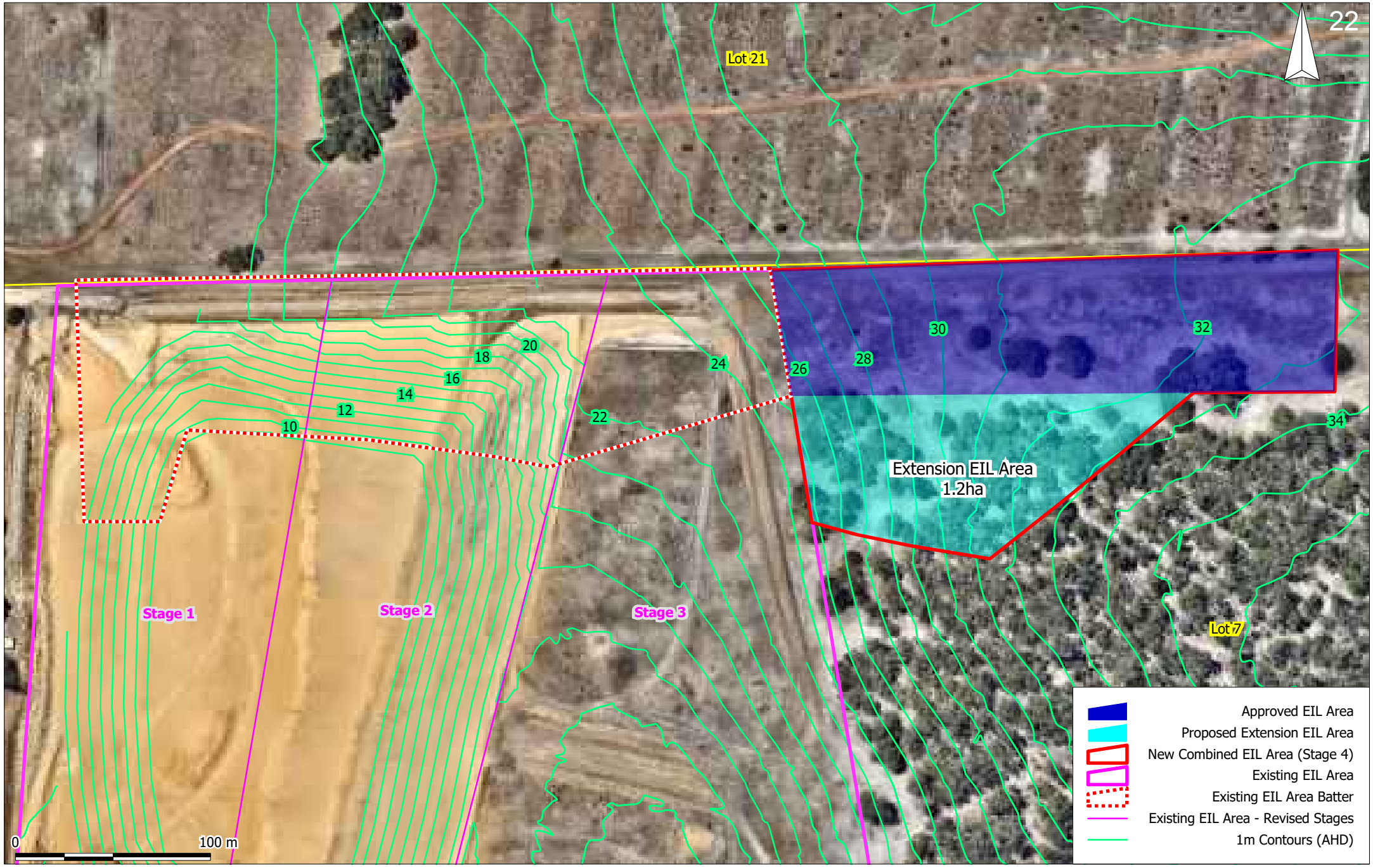
Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863
mikelund1@bigpond.com

Scale: 1:16000
Original Size: A4
Air Photo Source: Nearmap Dec 2019
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Rd Wellesley

Figure 2: Site and Surrounds

Z:\Catalano\Runnymede Rd Lots 4 & 7_Wellesley_SoH_Sand\Lot 7 Runnymede Rd\EIL\EIL Applications\2021 Amendment Application\Drawings\F2 Lot 7 site surrounds.map



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Leeming WA 6149

Mob: 0417934863, mikelund1@bigpond.com

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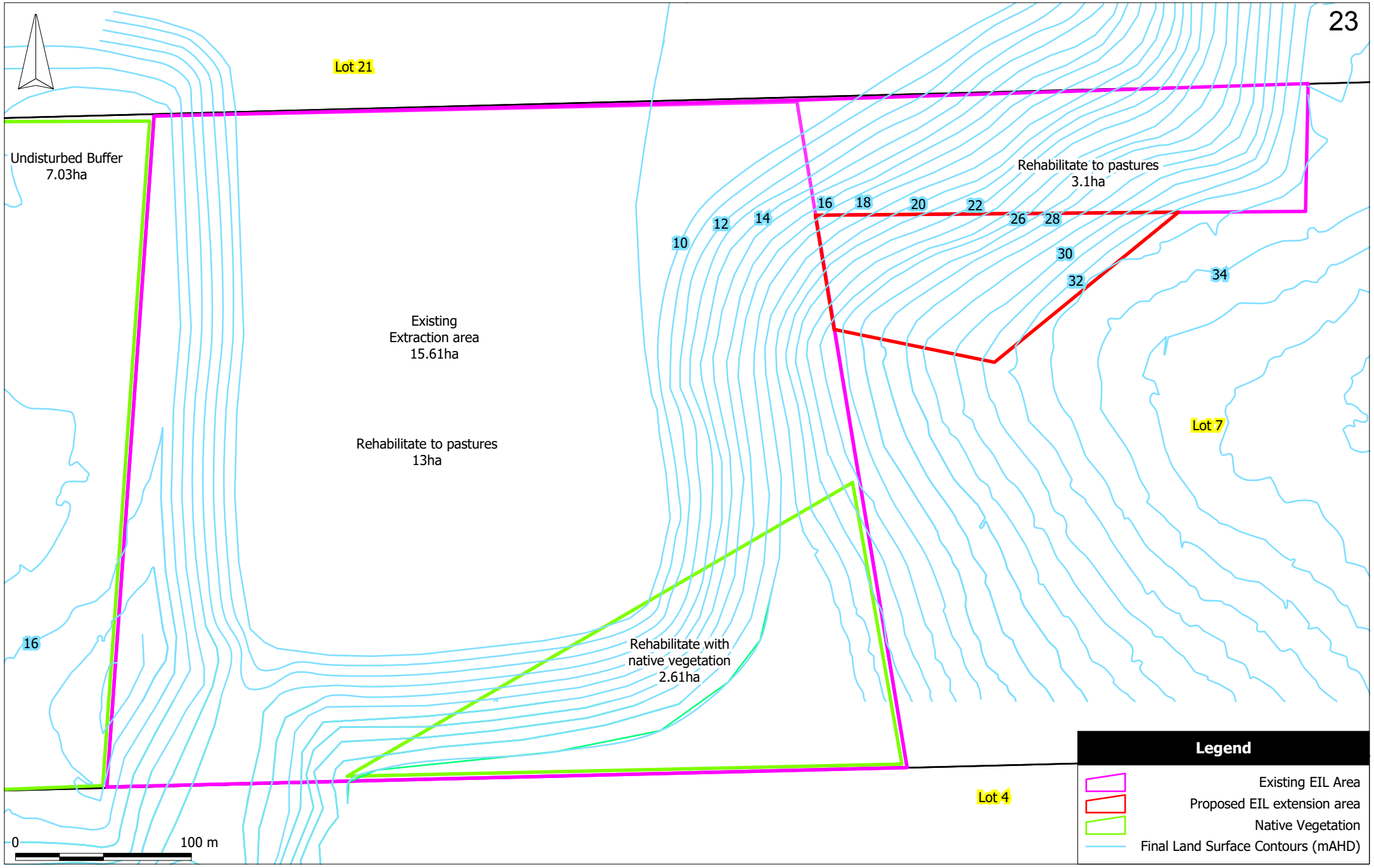
Original Size: A4
Air Photo Source: Nearmap Dec 2019
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Rd, Wellesley

Figure 3:

2021 Extension Area

Z:\Catalano\Runnymede Rd Lots 4 & 7_Wellesley_SoH_Sand\Lot 7 Runnymede Rd\EIL\EIL Applications\2021 Amendment Application\Drawings\F3 Lot 7 extraction area latest.map 31-Aug-21



Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863, mikelund1@bigpond.com

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Original Size: A4
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Rd, Wellesley

Figure 4:
Final Land Surface and Rehabilitation

Z:\Catalano\Runnymede Rd Lots 4 & 7_Wellesley_SoH_Sand\Lot 7 Runnymede Rd\EIL\EIL Applications\2021 Amendment Application\Drawings\F4 Final Land Surface and Rehab.map 23-Sep

APPENDIX 1:

APPLICATION FOR AMENDING A DEVELOPMENT APPROVAL FORM

SHIRE OF HARVEY
A Breath of Fresh Air

SHIRE OF HARVEY
DISTRICT PLANNING SCHEME NO. 1
s.77 APPLICATION FOR AMENDING OR CANCELLING A DEVELOPMENT APPROVAL

Office Use only
Registration No.: _____
Assessment No.: _____
Synergy No.: _____
Application Type: _____

OWNER/S DETAILS AND CONSENT			
Name/s	S, C & B Catalano		
ABN (if applicable)			
Address	B&J Catalano Pty Ltd, South Western Highway		
Suburb	Brunswick Junction WA	Post Code	6224
Phone Home		Mobile	0407857026
Work	97268100	Fax	
Email	peterbennett@catalano.com.au		
Contact Person:	Peter Bennett		
Signature:		Signature:	
Date:	25/08/2021	Date:	

Note: The signature of the owner/s is required on all applications. This application will not proceed without that signature. For the purposes of signing this application an owner includes the persons referred to in the Planning and Development (Local Planning Schemes) Regulations 2015 Schedule 2 Clause 62(2).

APPLICANT'S DETAILS (IF DIFFERENT FROM OWNER)			
Name/s	B&J Catalano Pty Ltd		
Address	South Western Highway		
Suburb	Brunswick Junction WA	Post Code	6224
Phone Home		Mobile	0407857026
Work	97268100	Fax	97261575
Email	peterbennett@catalano.com.au		
Contact Person for Correspondence:	Peter Bennett		
The information and plans provided with this application may be made available by the Shire for public viewing in connection with the application. ☑ Yes ☐ No			
Signature:		Date:	25/08/2021

PROPERTY DETAILS					
Lot No:	7	House/Street No:		Location No:	
Diagram or Plan No.	D40591	Certificate of title Vol. No:	1358	Folio:	260
Title encumbrances (e.g. easements, restrictive convenants):					
Street name	Runnymeade Rd	Suburb	Wellesley		
Nearest Street Intersection	Wellesley Road North				

DEVELOPMENT APPROVAL	
Nature of Development/Use Approved :	Sand extraction
Date of Development Approval:	10 September 2020

REASON FOR AMENDMENT OR CANCELLATION	
☐ Extension of time for the development/use approved to be substantially commenced	
Period of additional time requested:	
☐ Amend or delete any condition to which the Approval is subject	
Applicable conditions:	
☒ Amend an aspect of the development/use	
Will these amendments substantially change the development/use approved? ☒ No ☐ Yes (if Yes, a new Application for Development Approval is required)	
Details of amendments:	
Sand extraction over an additional 1.17ha of existing site.	
☐ Cancel the approval	
Reasons for cancellation:	

APPENDIX 2

PIT REHABILITATION AND MAINTENANCE MANAGEMENT PLAN

LUNDSTROM ENVIRONMENTAL CONSULTANTS Pty Ltd

ACN 600 398 945

21 Sellen Court
LEEMING
WA 6149

Tel 08 9310 3297 Mob:0417934863
email: mikelund1@bigpond.com
www.Lundstrom-Environmental.com.au

REHABILITATION ANDMAINTENANCE PLAN

Prepared for B&J Catalano Pty Ltd
For Lot 7 Runnymede Road, Wellesley
Shire of Harvey

1. INTRODUCTION

The purpose of this report is to describe the measures that will be taken to rehabilitate the area of land impacted by sand quarrying on Lot 7 Runnymede Road, Wellesley, Shire of Harvey. This document should be read in conjunction with other documents submitted by various authors to the Shire of Harvey and the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) in regard to the proposed sand quarry on this property. These documents include the following:

- Runnymede Road Cockatoo Management Plan (Ecoedge Pty Ltd)

The current application includes the extraction of the batter between Lot 7 and 21 and a new extraction area to the east of the existing pit on Lot 7 but does not change the commitments associated with the above-mentioned documents.

2. PROPOSED EXTRACTION

An updated summary of the proposed extraction operation is contained in Table 1.

Table 1: Stages of the Extraction Operation

Stage	Action	2017	2018	2019	2020	2021	2022	2023	2024	2025
PAST OPERATIONS										
1	Remove topsoil and stockpile									
1	Extract sand by loader & truck									
2	Remove topsoil and stockpile									
2	Extract sand by loader & truck									
3	Remove topsoil and stockpile									
3	Extract sand by loader & truck									
1	Rehabilitate Stage 1									
2	Rehabilitate Stage 2									
3	Rehabilitate Stage 3									
Infill planting	2.28ha native vegetation									
Revegetation	2.61ha native vegetation									
PROPOSED OPERATIONS										
New Extraction Area and Existing Pit Batter	Clearing of approx. 10 trees									
	Remove topsoil and stockpile									
	Extract sand by loader & truck									
	Rehabilitate									

3. REHABILITATION

3.1 PROPOSED REHABILITATION MEASURES

3.1.1 State and Federal Compliance

In order to comply with local, state and federal government approvals for this project, the following rehabilitation commitments have been made by B&J Catalano (Figure 1):

- A 9.31ha vegetated buffer along Runnymede Road will be maintained. This buffer comprises of two areas; a 2.28ha strip adjacent to Runnymede Road which has been infill planted with endemic species which are suitable as black cockatoo habitat, and an area of 7.03ha which will be retained, but not infill planted.

- Within the existing extraction area of 15.61ha, 13ha will be returned to pastures and 2.61ha will be planted with native vegetation using suitable black cockatoo habitat species.

- The new extraction area and existing pit batter will be returned to pastures.

3.1.2 Rehabilitation

It is proposed to rehabilitate the pit over the time period shown in Table 1 and this will involve the following actions:

- All batters behind the active working face will be contoured to achieve a slope of no more than 1:6. In achieving this, care will be taken not to impact fringing vegetation

- Final land surface will approximately 10m below surrounding natural ground levels.

- Stockpiled topsoil/overburden will be replaced as quickly as possible in order to maintain its viability and will be re-spread over completed areas so as to create a land surface, which is aesthetically pleasing, and easily trafficable.

- Final levelling of topsoil will be undertaken using light agricultural equipment to obviate excessive compaction and rutting.

- Within the 13ha area to be rehabilitated to pasture, a suitable pasture mix will be planted. Prior to seeding, a suitable compound fertiliser will be applied at a rate of 200kg/ha. Recommended pasture crops and seeding rates are as follows:

Goulbourn subclover	3kg/ha
Junee sub clover	6kg/ha
Prikkala subclover	6kg/ha
Serradella Cadiz	10kg/ha
Wimmera ryegrass	8kg/ha

- Within the 2.81ha area endemic native species suitable for black cockatoo habitat will be planted as described in 3.1.3 below.

- Rehabilitation work will only be carried out just prior to or at the commencement of the wet season.

- Any weed control required will be undertaken as and when required. This is discussed in the Weed Management Plans.

3.1.3 Native Plant Species and Planting Rates

Table 2 contains proposed species and planting rates for the 2.61ha area identified for in-pit rehabilitation (Figure 1). It should be noted that upper storey plant species identified in Table 2 have already been utilised for infill planting within the 2.28ha buffer strip adjacent to Runnymede Road.

Table 2: Proposed Species and Planting Rates

Storey	Species	Planting Rate
Upper	*Eucalyptus gomphocephala, Eucalyptus marginata, Corymbia calophylla, Agonis flexuosa, Banksia attenuata.*	Treelings to be planted at a rate of 1100 stems per ha, staggered.
Middle and lower	Middle and lower storey to be direct seeded with the following species: *Calothamnus quadrifidus, Acacia extensa, A. pulchella, Astartea scoparia, Melaleuca incana, M. pauciflora, M. preissiana, M. thymoides, M. teretifolia, M. huegelii, Kunzea ericifolia, Hypocalymma angustifolium, Hardenbergia comptoniana, Kennedia prostrate*	3kgs of seed mix per ha.

3.2 MONITORING AND MAINTENANCE

Monitoring of rehabilitated areas will ensure that any areas requiring remedial work are identified. Monitoring will be carried out on an annual basis to assess:

- The physical stability of the landform in the rehabilitated areas.
- Success of germination of pasture grasses and native endemic species.
- The emergence of weeds.

Monitoring will continue until the completion criteria presented in Section 3.3 have been fulfilled. Maintenance procedures will be carried out where necessary and will include:

- Repair of any erosion damage.
- Replanting/seeding areas that may not have regenerated.
- Weed control.

3.3 COMPLETION CRITERIA

Completion criteria must be sufficiently stringent to ensure that the overall objectives of the rehabilitation have been met. These criteria must also be designed to allow effective reporting and auditing to define an endpoint for the rehabilitation activities.

The completion criteria proposed for extractive operations on Lot 7 are presented in Table 3.

Table 3: Closure Criteria, Objectives, Monitoring, Maintenance and Interim Targets

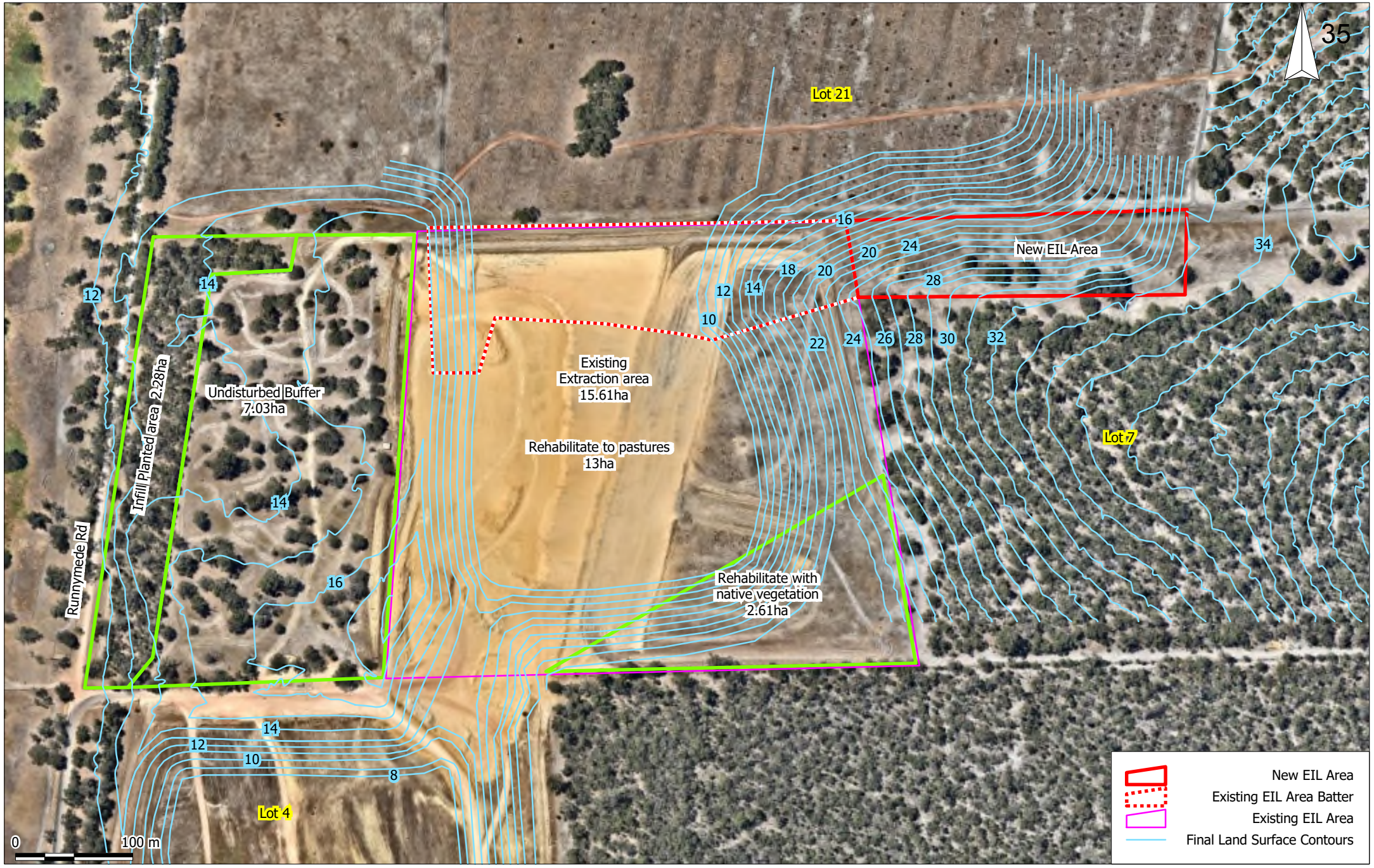
Criteria	Objective	Interim Targets
1. Safety	The site is safe to humans.	• Site is safe to humans during operations.
2. Sustainability	The site is sustainable in the long term without additional management inputs.	-
3. Suitability	The site is suitable for agricultural uses.	-
4. Visual amenity and heritage	The rehabilitated extraction area blends into the surrounding environment.	-
5. Off-site impacts	Significant adverse off-site impacts are prevented.	-
6. Hydrology	a. Site hydrology does not prevent the establishment of desired vegetation. b. Site hydrology does not reduce the stability of the landform. c. Stormwater is contained within the site.	• Stormwater is contained within the site during operations. Identification and mitigation of any hydrology related issues during operations.
7. Soils and stability	a. Soil profiles and structures are sufficient to ensure vegetation establishment. b. The landform is stable.	• Topsoil is respread in all rehabilitation areas. Identification and mitigation of potential erosion scars and scours during operations.
8. Vegetation	a. Pasture grasses cover the entire targeted area of 13ha. b. Pasture grass cover is sufficiently resilient to sustain grazing pressure. c. Native species planted as buffers along the northern and eastern boundaries include *E. gomphocephala, Corymbia calophylla, Banksia attenuata and Agonis flexuosa.* Survival rates to be 1,100 stems per ha. d. Monitoring will be conducted on an annual basis just prior to the wet season and will include plant survival rates and stability of the constructed batters. e. Maintenance will include the replacement of plants in all areas that do not meet the interim targets	After 1 year pasture grasses cover 30% of target area, increasing by 20% per annum thereafter. For native plants: After the first season at least 50% survival rate after the following dry season. Successful establishment of 70% of plant propagules after 1 year, 80% by year 3 and 100% by year 7. The existence of at least 1,100 stems per ha (on average). Inspection by qualified botanist 3 and 5 years after native vegetation planting to assess survival rates and plant condition.
9. Weeds	a. Declared pest weeds are absent. b. The level of weed species should not be detrimental to the planted seedlings or pasture grasses.	Weed species removed systematically during operations.

4. ATTACHMENTS

FIGURES

Figure 1 Final Land Surface and Rehabilitation

FIGURES



Lundstrom Environmental Consultants Pty Ltd

Leeming WA 6149

Mob: 0417934863, mikelund1@bigpond.com

Scale: 1:4100
Original Size: A4
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Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Rd, Wellesley

Figure 1:
Final Land Surface and Rehabilitation

\\lecserver\DATA\Catalano\Runnymede Rd Lots 4 & 7_Wellesley_SoH_Sand\Lot 7 Runnymede Rd\2020 Application\Drawings\F4 Final Land Surface and Rehab.map 10/03/2020

APPENDIX 3

WEED MANAGEMENT PLAN

LUNDSTROM ENVIRONMENTAL CONSULTANTS Pty Ltd

ACN 600 398 945

21 Sellen Court
LEEMING
WA 6149

Tel 08 9310 3297 Mob:0417934863
email: mikelund1@bigpond.com
www.Lundstrom-Environmental.com.au

WEED MANAGEMENT PLAN

Prepared for B&J Catalano Pty Ltd
For Lot 7 Runnymede Road, Wellesley
Shire of Harvey

1. INTRODUCTION

This Weed Management Plan (WMP) has been prepared in accordance with guidelines published by the Department of Agriculture and Food (DAF) (DAF 2014).. This WMP should be read in conjunction with the report titled "*Extractive Industries Licence Application & Environmental Management Plan (EMP), Lot 7 on Diagram 40591 Runnymede Road, Wellesley*, prepared for B&J Catalano, March 2020".

2. LOCALITY AND OWNERSHIP

Locality: Lot 7 Runnymede Road, Wellesley, Shire of Harvey

Ownership: B, C & S Catalano

Figure 1 is a recent aerial photograph showing the property and surrounds, also identifying the extraction area.

3. THE DEVELOPMENT PROPOSAL

B&J Catalano propose to extract a total of approximately 160,000m3 of sand from two additional areas; an area of 1.97ha immediately to the east of the existing pit (~70,000m^3) and the northern batter of the existing pit adjoining Lot 21 (~90,000m^3) as shown in Figure 1.

It is estimated that the existing approved resource (15.61ha) has 80,000m^3 remaining. The additional resource created by this application will thus make a total available resource from this site of approximately 240,000m^3. Annual extraction will be approximately 50,000m^3 per annum, this may vary depending on the demand for sand.

It is intended to rehabilitate 2.61ha to native vegetation and the remainder of the disturbed area back to pastures.

4. RESPONSIBILITIES

B&J Catalano Pty Ltd accepts responsibility for weed management within the present and past extraction areas and any areas identified within the conditions of approval set by the Shire of Harvey. All other areas on the property will remain the responsibility of the landowner.

5. CURRENT WEED STATUS OF THE PROPERTY

Based on recent field visits, no declared weeds or weeds of local or regional significance were observed. It is acknowledged that the proposed ground disturbance may result in the germination of certain weeds, but the species will not be known until emergence. Cotton bush and apple of Sodom are known weeds that are likely to occur and these will be specifically targeted in the routine management.

6. PROPOSED WEED MANAGEMENT ACTIONS

The following is a general description of the actions that will be implemented by B&J Catalano Pty Ltd for weed management:

6.1 Weed Management Zones on the Subject Land

For the purpose of this WMP, the subject land has been allocated zones as follows:

Zone A: This is all the land within the quarry and includes the base of the excavation, roadways and stockpiles of topsoil, overburden and all product stockpiles.

Zone B: This is all land that is at natural level and which extends 100 meters beyond the perimeter of the quarry and includes any stockpiles of soil or overburden created by the excavation.

6.2 Weed Emergence Monitoring

Monitoring of the emergence of weeds in Zones A and B will be undertaken by an experienced and licenced weed management contractor on a 6 monthly basis i.e. after the first seasonal rains and at the end of spring. In addition, B&J Catalano personnel on the site will be instructed to report any infestations that may occur on other occasions. Based on the type of weed that emerges, a control plan will be formulated by the licenced weed management contractor.

6.3 Import and Export of Weeds

B&J Catalano will ensure that all plant and equipment is clean and free of any soil when moving any equipment to or from the site. B&J Catalano will also ensure that any quarry products imported to the site will be free of weeds.

6.4 Weed Control Program

If a weed infestation occurs within Zones A or B, the licenced weed management contractor will apply the appropriate method of control, in accordance with the guidelines published by the DAF , whether chemical or mechanical, at the appropriate time. The weed management contractor will keep a record of all treatments.

7. REFERENCES

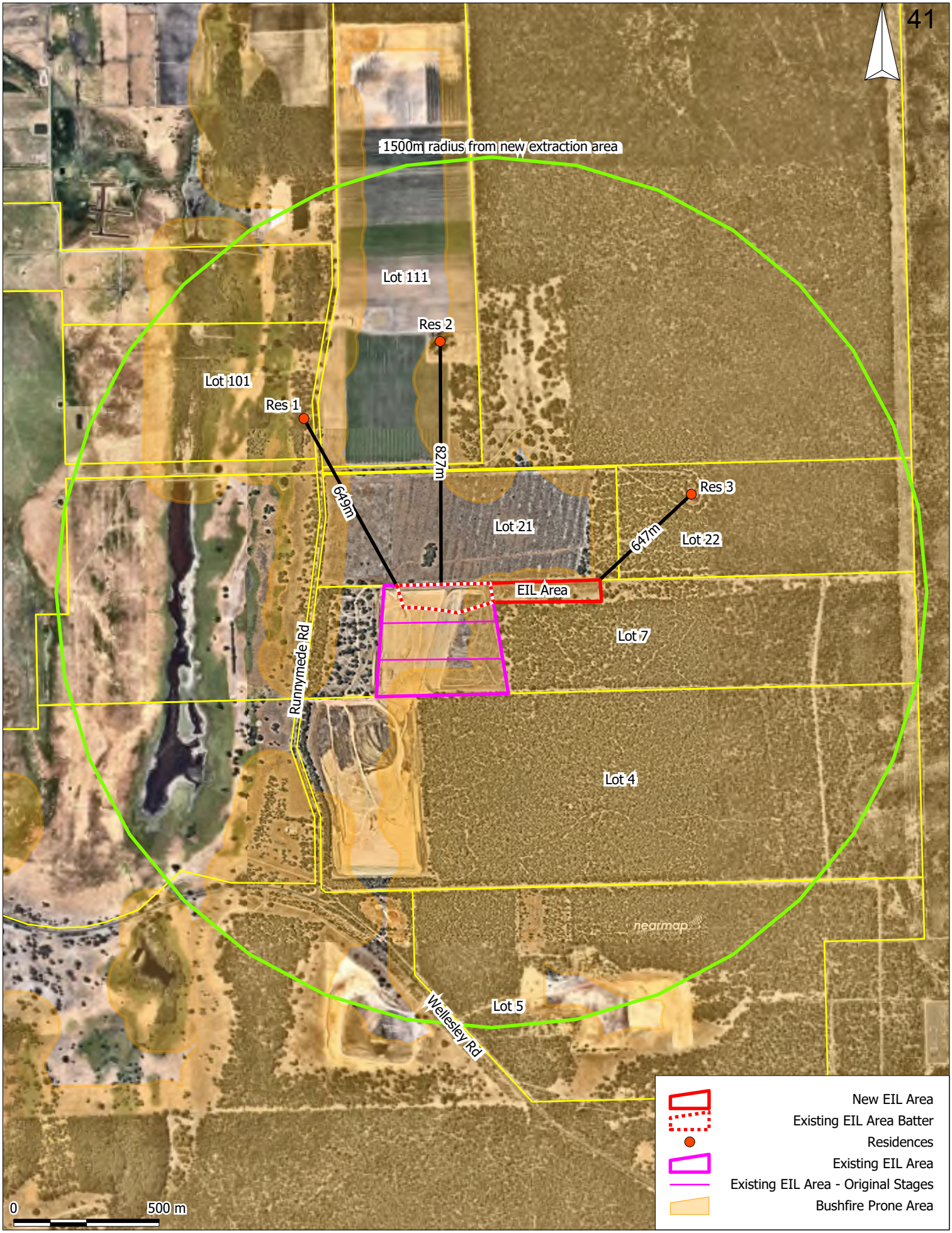
Department of Agriculture and Food (DAF) (2014). Department of Agriculture and Food WA Guidelines for weed control procedures for extractive industries licence.

8. ATTACHMENTS

FIGURES

Figure 1 Site and Surrounds

FIGURES



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Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Rd Wellesley

Figure 1: Site and Surrounds

APPENDIX 4

WATER MANAGEMENT PLAN

LUNDSTROM ENVIRONMENTAL CONSULTANTS Pty Ltd

ACN 600 398 945

21 Sellen Court
LEEMING
WA 6149

Tel 08 9310 3297 Mob:0417934863
email: mikelund1@bigpond.com
www.Lundstrom-Environmental.com.au

WATER MANAGEMENT PLAN

Prepared for B&J Catalano Pty Ltd
For Lot 7 Runnymede Road, Wellesley
Shire of Harvey

1. INTRODUCTION

This Water Management Plan (WMP) relates to an application for sand extraction from a 1.97ha area located to the east an existing pit Lot 7 Runnymede Road, Wellesley in the Shire of Harvey. It is also proposed sand from the northern wall of the existing pit adjoining Lot 21 as a sand quarry is also proposed at this site and it is planned to eventually join the neighbouring pits. This WMP should be read in conjunction with the report titled "*Extractive Industries Licence Application & Environmental Management Plan (EMP), Lot 7 on Diagram 40591 Runnymede Road, Wellesley*, prepared for B&J Catalano, March 2020".

This report provides the following information:

- A description of the property and surrounds indicating the current contours.
- A description of the proposed stockpile removal and rehabilitation program.
- Storm water and erosion management measures.
- A description of the groundwater regime in the area.
- A description of the proposed final land use after extraction has been completed.
- A description of potential impact on surrounding wetlands.
- A description of the potential for acid sulfate soil impacts.

2. PROPERTY DESCRIPTION, OWNERSHIP AND LOCALITY

Property Description:	Lot 7 Runnymede Rd Wellesley Shire of Harvey
Area:	80.18 hectares
Ownership:	S, C & B Catalano Pty Ltd
Latitude:	-33.1392
Longitude:	115.7496

The property is situated approximately 23 km north of Bunbury and is currently used for sand extraction. The property has historically been used for the grazing of livestock.

Figure 1 is a recent aerial photograph showing the proposed and existing operations on the property.

3. SURROUNDING LAND USE

Lot 4 adjoining it to the south is also operated by B&J Catalano for sand extraction. Main Roads proposes to establish a sand quarry on Lot 21 adjoining the property to the north. The historic use of Lot 21 was as a pine plantation but in January 2016, the pines were harvested (LEC, 2020). Other properties surrounding the proposed operation are mainly used for grazing. Figure 1 illustrates the land use patterns of the immediate surrounds.

4. PROPOSED WORKS AND POTENTIAL IMPACTS

B&J Catalano propose to extract a total of approximately 160,000m3 of sand from two additional areas; an area of 1.97ha immediately to the east of the existing pit (~70,000m^3) and the northern batter of the existing pit adjoining Lot 21 (~90,000m^3) as shown in Figure 1.

It is estimated that the existing approved resource (15.61ha) has 80,000m^3 remaining. The additional resource created by this application will thus make a total available resource from this site of approximately 240,000m^3. Annual extraction will be approximately 50,000m^3 per annum, this may vary depending on the demand for sand.

It is intended to rehabilitate 2.61ha to native vegetation and the remainder of the disturbed area back to pastures.

The following Table outlines the proposed mining actions:

Table 1: Stages of the Mining Operation

Stage	Action	2017	2018	2019	2020	2021	2022	2023	2024	2025
PAST OPERATIONS										
1	Remove topsoil and stockpile									
1	Extract sand by loader & truck									
2	Remove topsoil and stockpile									
2	Extract sand by loader & truck									
3	Remove topsoil and stockpile									
3	Extract sand by loader & truck									
1	Rehabilitate Stage 1									
2	Rehabilitate Stage 2									
3	Rehabilitate Stage 3									
Infill planting	2.28ha native vegetation									
Revegetation	2.61ha native vegetation									
PROPOSED OPERATIONS										
New Extraction Area and Existing Pit Batter	Clearing of approx. 10 trees									
	Remove topsoil and stockpile									
	Extract sand by loader & truck									
	Rehabilitate									

5. EXISTING ENVIRONMENT

5.1 TOPOGRAPHY, HYDROLOGY AND WETLANDS

Lot 7 has natural elevations ranging between approximately 12 and 52mAHD (Landgate 2020). There is an existing pit on the property with a final, rehabilitated pit floor elevation of 9 mAHD and batters of 1:6 (Figure 3). The new extraction area is located immediately to the east of the existing pit and slopes gently from 35 mAHD in the east and 26 mAHD in the west (Figure 3).

There are no defined drainage lines within the extraction area as drainage occurs by infiltration into the porous sand surface. Runoff is unlikely to be generated by heavy winter rainfalls due to the porous nature of the surface and low slopes within the extraction area.

A dampland wetland (Myalup Swamp) located to the west of property, approximately 370 metres from the proposed operations on site. The management category for most of this wetland is classified as Multiple Use but a small portion of the wetland, 1.5km from the proposed operations, is classified as Conservation. There is also a dampland Conservation wetland, approximately 1.1km to the east of the EIL area (Landgate 2020). These Conservation wetlands are also EPP wetlands.

No Environment Protection Policy (EPP) lakes or ANCA or RAMSAR wetlands exist within 1 000 metres of the proposed extraction areas (Landgate 2020 and WALGA 2020).

The site does not fall within a RIWI Surface Water Proclamation Area (Landgate 2020).

5.2 GEOLOGY AND SOILS

The entire property is covered by grey and yellow sands of the Spearwood System comprising mainly dunes and dune ridges. The sand reaches a maximum thickness of 18 metres and is underlain by sandy clays of the Guildford Formation and limestone of the Tamala Formation.

5.3 GROUNDWATER HYDROLOGY

The property lies within a Rights in Water Irrigation Act 1914 (RIWI) Groundwater Proclamation Area (South West Coastal Groundwater Area) overseen by the DWER.

The property does not fall within a Public Drinking Water Source Area.

An evaluation of groundwater hydrology was conducted recently in January 2020 by Lundstrom Environmental for Main Roads for the neighbouring property to the north (Lot 21) (LEC, 2020). Analysis of data on groundwater levels focused on the last five years of bore data due to harvesting of pines on Lot 21 in 2016 and a trend in declining rainfall in the area. The results of this investigation have been used to determine the groundwater flow direction and maximum groundwater level under Lot 7 as detailed below.

The nearest long-term Department of Water and Environmental Regulation (DWER) monitoring bores installed in the superficial aquifer surrounding the site are the Lake Clifton Bores E1B, E2B, E3B, E4A, E5B, E7, F1, F2A, F3, F5, F9A, G4, G5 and G6 (Table 1). Hydrographs of these DWER monitoring bores are included in Annexure 1.

Recent data on groundwater levels has also been collected from three private monitoring bores near the site as detailed in Table 2 below. One of these bores is located on a sand quarry approximately 0.5km to the south of the site (Lot 4 Runnymede Road, Wellesley) and two are located on a sand quarry approximately 3km to the northwest (Lot 24 Old Coast Road, Myalup). Hydrographs for these bores are included in Annexure 2.

The hydrographs attached in Annexures 1 and 2 show that water levels in the bores surrounding the site have remained relatively stable over the past 5 years.

Groundwater contours have been drawn using available data from both DWER bores and private monitoring bores for the following:

- **Maximum GWL - October 2017 (Figure 2).**
  The contours shown on this figure are representative of maximum groundwater levels at the site because this is the date of the highest water level recorded in the Lot 4 monitoring bore and the third highest water level recorded over the past five years at F5. The historical maximum in F5 for this period was only 0.14 m higher.

The above data gave a good estimate of the contours for the western portion of the site, however the position contours for the eastern portion of the site were estimated based on the hydraulic gradient under the site and the hydraulic gradient for the E line and G line bores. These bores are too far to extrapolate for this site, however dashed contour lines have been drawn to provide an estimation of the groundwater height for the eastern portion of the site.

Groundwater Flow Direction

The contours for October 2017 show the water table rises in an easterly direction beneath the site. This confirms that the groundwater flow direction is towards the wetland immediately to the west of the site.

Maximum Groundwater Levels

The hydraulic gradient that existed under the site in October 2017 was 1:263. Using the contours at this time, it can be estimated that the water table was approximately 8 mAHD beneath the portion of the old EIL area batter that will be removed and approximately 10 mAHD at the eastern boundary of the new EIL area (Figure 2).

Given that the historical maximum recorded over the past five years for F5 was 0.14m higher, the maximum groundwater level at Lot 7 is estimated to be approximately 8.14 mAHD beneath the old EIL area batter and approximately 10.14 mAHD at the eastern boundary of the new EIL area.

Main Roads intends to undertake further monitoring of from on-site bores/piezometers on Lot 21. If further groundwater monitoring data becomes available this will be used to refine the current estimation of the maximum groundwater level.

Table 1: Summary of Groundwater Level (GWL) Data for DWER Monitoring Bores 2014 to 2019 (DWER 2020)

Bore ID	Ground Elevation (mAHD)	Distance and Direction from site	Historic Max. GWL (mAHD)	Date of Historic Max. GWL	Oct 2017 GWL (mAHD)	Historic Min. GWL (mAHD)	Date of Historic Min. GWL*	Mar 2019 GWL (mAHD)	Median GWL (mAHD)
E1B	0.485	8.1 km NW	-0.193	22/09/2017	-0.293	-1.003	21/05/2014 and 21/05/2015	-0.773	-0.693
E2B	5.548	7.7 km NW	1.874	22/09/2017 and 19/10/2017	1.874	0.914	21/04/2017 and 19/05/2017	0.914	1.154
E3B	5.900	7.6 km NW	3.981	21/09/2017 and 20/09/2018	3.741	2.391	20/05/2019	2.811	3.041
E4A	16.553	7.5 km NW	8.419	21/10/2014	8.279	7.689	20/05/2019	7.889	8.069
E5B	13.274	7.7 km N	9.485	21/10/2014	9.195	8.865	20/05/2019	8.915	9.145
E7	17.462	8.0 km NE	14.404	21/09/2017	14.214	13.024	22/05/2018	13.174	13.414
F1	3.923	4.6 km SE	2.419	21/10/2014	1.913	1.223	18/04/2019	1.253	1.833
F2B	2.133	3.8 km SE	1.953	20/09/2018	1.233	0.043	18/03/2016	0.213	0.493
F3	7.680	2.9 km SE	2.982	19/09/2019	2.632	1.222	17/05/2019	1.322	1.778
F5	6.580	1.5 km SE	4.509	21/09/2017	4.369	3.249	18/03/2016	3.329	3.479
F9A	8.084	1.9 km E	4.123	21/10/2014	3.993	3.073	21/05/2018	3.243	3.363
G4	12.488	4.3 km SE	3.55	21/10/2014	3.230	2.668	17/03/2014	2.770	2.995
G5	8.036	4.5 km S	5.661	21/10/2014	5.401	4.551	18/04/2019	4.571	5.021
G6	38.598	4.4 km S	11.375	20/11/2014	11.145	10.845	17/05/2019	10.925	11.085

Table 2: Summary of Groundwater Level (GWL) Data for Private Monitoring Bores

Bore ID	Top of Casing Elevation (mAHD)	Distance and Direction from site	Historic Max. GWL (mAHD)	Date of Historic Max. GWL	Oct 2017 GWL (mAHD)	Historic Min. GWL (mAHD)	Date of Historic Min. GWL*	Mar 2019 GWL (mAHD)	Median GWL (mAHD)	Period Monitoring Data Available
Lot 4 MB	12.290	0.5 km S	6.54	11/10/2017	6.54	5.79	13/03/2019	5.79	6.09	September 2016 to June 2019
Lot 24 MB - W	8.200	3.2 km NW	2.900	30/11/2017	2.200	1.700	30/04/2019	2.100	2.200	August 2015 to June 2019
Lot 24 MB - E	7.995	2.9 km NW	3.345	29/09/2018	-	2.245	30/04/2016	2.695	2.745	August 2015 to June 2019

5.4 RAINFALL

One of the closest open rainfall recording stations with long term rainfall records is Roelands (~16km) and it has a mean annual rainfall of 881.7 mm. The wettest months are May, June and July and the driest months are December, January and February. The highest recorded rainfall was 1423 mm in 1945 and the lowest was 476 mm in 2010. Table 2 shows the average monthly and annual rainfall for Roelands.

Table 2: Mean Rainfall Data for Roelands 9657 for Period 1942 to 2019 (BoM 2020a)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
12.3	11.3	22.2	49.0	124.4	179.0	173.4	129.3	86.5	51.2	31.6	15.9	881.7

Rainfall intensity has been calculated using the Bureau of Meteorology (BoM) Rainfall Intensity-Frequency-Duration (IFD) data system (BoM 2020b), which yields the 2hr 10% Annual Exceedance Probability (AEP) (37.8 mm). The DWER recommends that surface water runoff produced within the mined area from this rainfall event should be contained within the pit (DWER 2019). This aspect is discussed later in this document.

6. WATER MANAGEMENT

6.1 STORMWATER MANAGEMENT

The existing pit and the final landsurface will be internally draining, with the final levels being approximately 10m below surrounding natural ground levels. Stormwater within the pit area will drain internally and will therefore not impact on the surrounding landsurface.

6.2 SURFACE WATER MANAGEMENT

Due to the very permeable nature of the sand within the operational area, it is unlikely that any expression of surface water will exist, even after heavy winter rains.

6.3 GROUND WATER MANAGEMENT

No groundwater will be permanently exposed by this development since excavation of the old EIL area batter will only proceed until a level of 9.0 m AHD has been reached, which will be more than 0.3m above the estimated maximum water table level (8.14 mAHD beneath the old EIL area batter to be removed). This is in line with the DWER recommended minimum separation depth of 300mm between the base of the pit and the likely maximum seasonal groundwater level (Brendan Kelly, pers. comm. September, 2019).

The land surface beneath the old EIL batter will be rehabilitated to a final level of 9.0 m AHD so it is level with the existing pit. This level is more than 500mm above the estimated maximum water table level beneath this location, and in keeping with the DWER recommendations (Brendan Kelly, pers. comm. September, 2019).

The depth of the excavation of the new EIL area is constrained by the fact that the entire area needs to serve as a batter to the Main Roads pit on Lot 21, with a slope of 1:6. Excavation of the new EIL area will only proceed until a minimum of 16 m AHD is reached in the north western corner. The final landsurface will slope upwards to the north eastern corner which will have final of elevation of 33 m AHD. The levels of this batter will be approximately 6 to 23m above the estimated maximum water table level beneath the new EIL area (approximately 8.5 to 10m AHD), therefore well above the DWER requirements.

The proposed final land surface is shown on Figure 3.

When water is required for dust management, it will be abstracted from a production bore on Lot 4 Runnymede Road. The abstraction of minor volumes of water for dust suppression is not expected to have significant impact on local groundwater levels.

No dewatering activities will be undertaken.

Due to the low scale nature of the operations, no groundwater contamination is anticipated and there is no risk to any private groundwater supply. No fuel or lubricant storage will occur on the site. Refuelling will take place using a mobile refuelling vehicle which is equipped with a "snap-on snap-off, fast-fill and auto shut-off" facility. Plant will be refuelled each morning, leaving the vehicles almost empty overnight. No major servicing, which could lead to fuel and oil spills, will take place on the site. Minor spills which may occur occasionally will be neutralised by soil processes. B&J Catalano have a Safety Practice document for Hydrocarbon Spill Response outlining their procedures for controlling, recovering, treating and reporting hydrocarbon spills (Annexure 1).

6.4 MONITORING AND MANAGEMENT MEASURES

During the extraction and early rehabilitation phase, the pit will be inspected after every significant rainfall event to check erosion damage. If any repairs are required, this will be attended to immediately.

After pit closure and rehabilitation, monitoring of rehabilitated areas will ensure that any areas requiring remedial work are identified. Monitoring will be carried out on an annual basis to assess:

- The physical stability of the landform in the rehabilitated areas.
- The success of the planted vegetation.
- The emergence of weeds.

Monitoring will continue until the completion criteria have been fulfilled. Maintenance procedures will be carried out where necessary and may include:

- Repair of any erosion damage.
- Replanting/seeding areas that may not have regenerated.
- Weed control.

7. ACID SULFATE SOILS

A search of the CSIRO's Australian Soil Resource Information System (ASRIS) database identified the probability acid sulfate soils occurring within the proposed EIL area as extremely low/confidence unknown (CSIRO, 2020).

A low probability of ASS within the EIL area is likely because the material to be excavated is deep Spearwood sands with rapid drainage characteristics. There are no remnant swampy sediments within the extraction area where acid sulphate soils might be exposed or activated as a result of the proposed extraction activities. The extraction will remain above the water table at all times.

8. REFERENCES

Bureau of Meteorology (BoM) (2019a). Rainfall records for Roelands (Station 9657). Website: www.bom.gov.au. Accessed January 2020.

Bureau of Meteorology (BoM) (2020b). Rainfall frequency information. Website: www.bom.gov.au. Accessed January 2020.

CSIRO (2020). Australian Soil Resource Information System (ASRIS). [Online], http://www.asris.csiro.au. Accessed January 2020.

Department of Water and Environment Regulation (DWER) (2019). Water quality protection note no. 15, Basic raw materials extraction. Government of Western Australia.

Department of Water and Environmental Regulation (DWER) (2020). Monitoring bore data accessed from WIR website: http://wir.water.wa.gov.au/SitePages/SiteExplorer.aspx. Accessed: January 2020.

Landgate (2020). Locate V5. [Online] https://maps.slip.wa.gov.au/landgate/locate/. . Accessed January 2020.

Lundstrom Environmental Consultants (LEC) (2020). Groundwater Investigation for Lot 21 Runnymede Road, Binningup. Draft report prepared for Main Roads, Western Australia, February 2020.

WALGA (2020). Environmental Planning Tool (EPT). [Online], http://lbp.asn.au/index_public.html. Accessed January 2020.

9. ATTACHMENTS

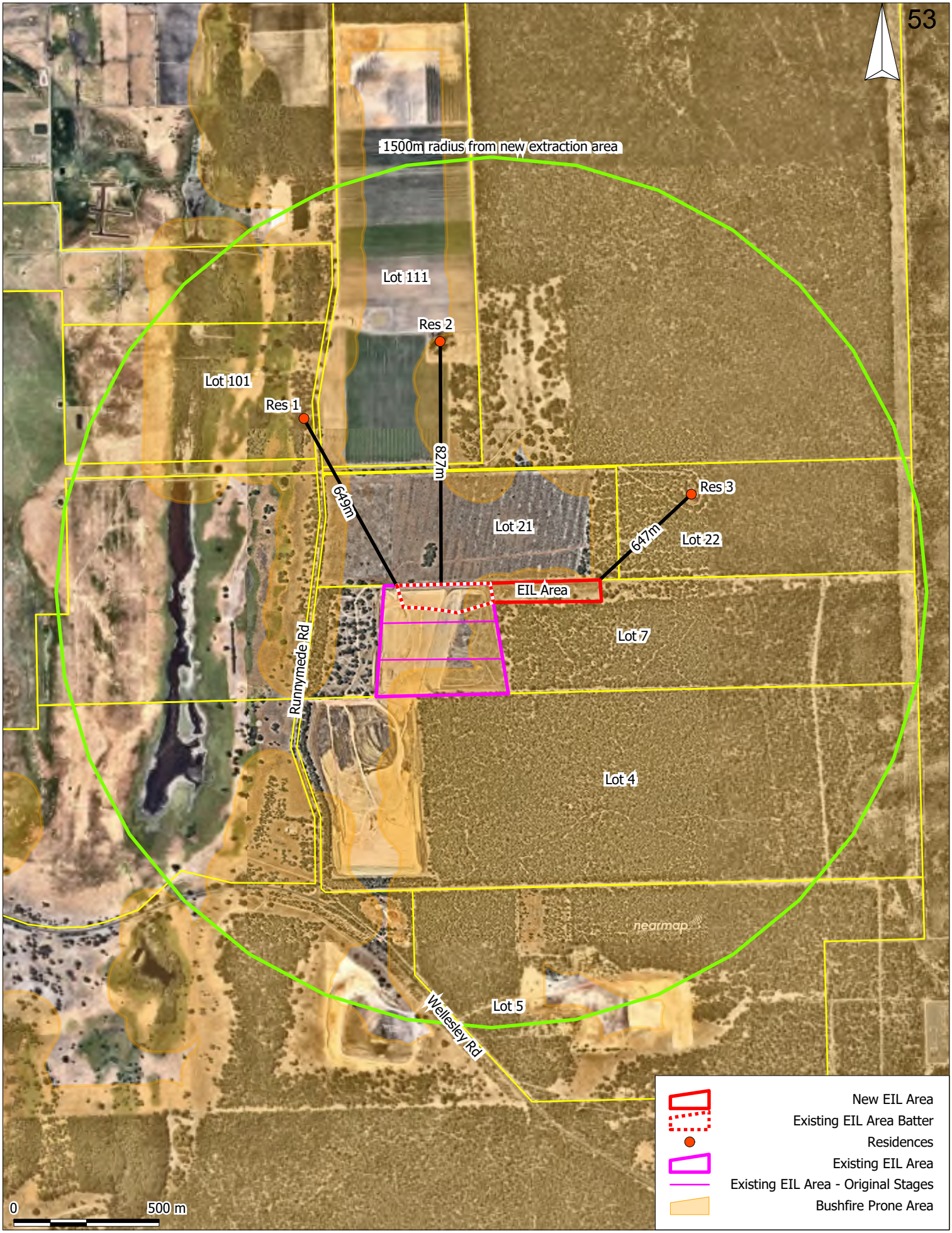
FIGURES

Figure 1 Site and Surrounds
Figure 2 Regional Groundwater Contours Oct 2017

ANNEXURES

Annexure 1 Hydrocarbon Spill Management Plan

FIGURES

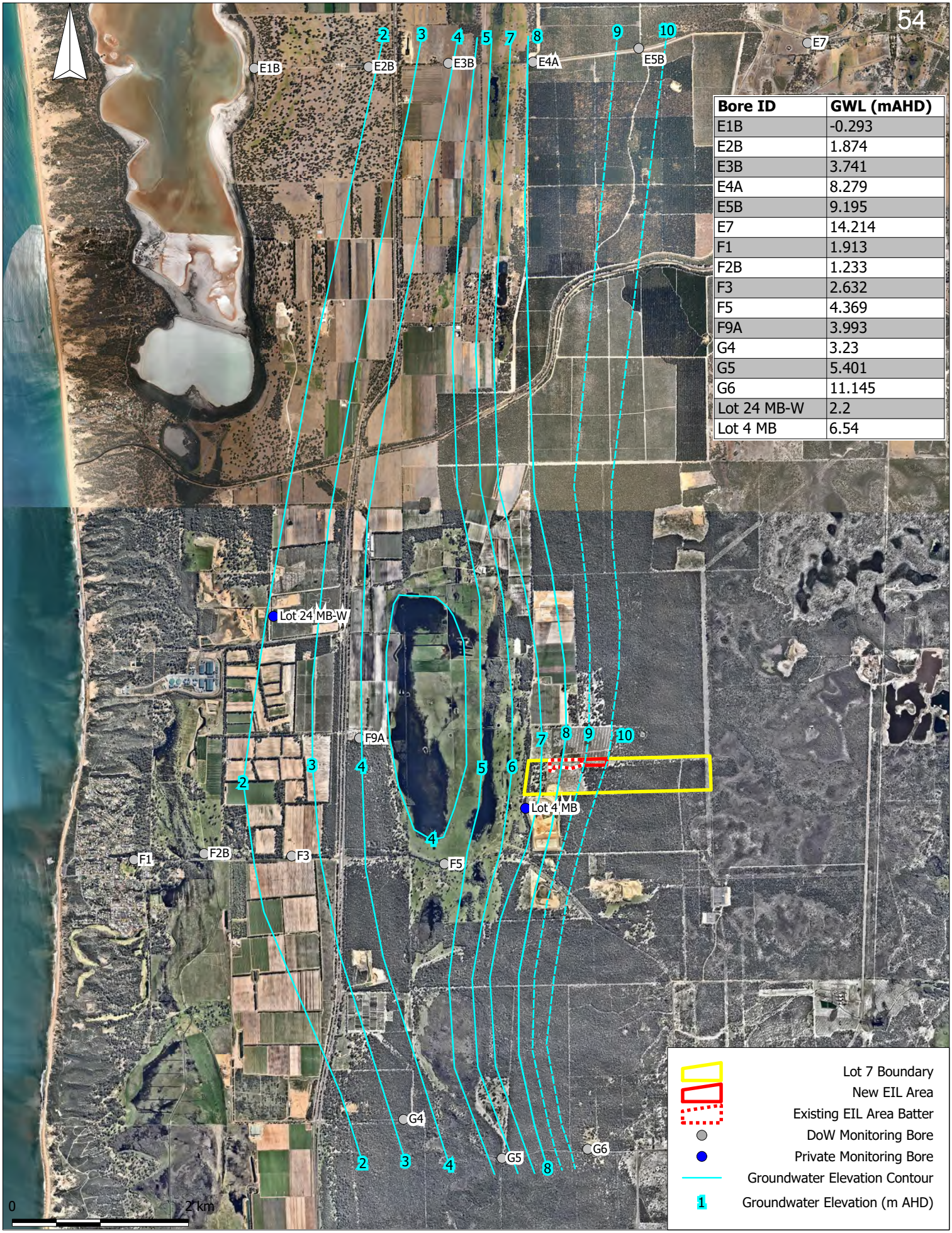


Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863
mikelund1@bigpond.com

Scale: 1:16000
Original Size: A4
Air Photo Source: Nearmap Dec 2019
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Rd Wellesley

Figure 1: Site and Surrounds



Bore ID	GWL (mAHD)
E1B	-0.293
E2B	1.874
E3B	3.741
E4A	8.279
E5B	9.195
E7	14.214
F1	1.913
F2B	1.233
F3	2.632
F5	4.369
F9A	3.993
G4	3.23
G5	5.401
G6	11.145
Lot 24 MB-W	2.2
Lot 4 MB	6.54

Lot 7 Boundary
New EIL Area
Existing EIL Area Batter
DoW Monitoring Bore
Private Monitoring Bore
Groundwater Elevation Contour
1 Groundwater Elevation (m AHD)

Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863
mikelund1@bigpond.com

Scale: 1:54000
Original Size: A4
Air Photo Source: Nearmap Aug 2017
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Road Wellesley

Figure 2:
Regional Groundwater Contours Oct 2017

ANNEXURE 1

Hydrocarbon Spill Management Plan

Safety Practice

SAF-SP-029 HYDROCARBON SPILL RESPONSE

PURPOSE

This procedure summarises the safety practice of B & J Catalano to control the personal and environmental hazard posed by hydrocarbon spills. It outlines the correct procedure for controlling, recovering and reporting hydrocarbon spills to ensure compliance with West Australian legislative requirements.

SCOPE

This safety practice will apply to all B & J Catalano areas and employees.

DEFINITIONS

MSDS: Material Safety Data Sheet - A document which describes the properties and use of a substance, i.e., its identity, chemical and physical properties, health hazard information, precautions for use and safe handling information.

Hydrocarbon: An organic compound containing only carbon and hydrogen including diesel, oil, petrol, grease, solvent-based degreasers, hydraulic fluids and transformer oils.

Hydrocarbon Spill: Any uncontrolled release of hdyrocarbon products.

Bund: An embankment or wall that may form part or the entire perimeter of a compound. Usually made of concrete, bunds are placed around storage tanks to contain spills.

INFORMATION

Under the general and specific provision of duty of care an employer shall, so far as is practicable, provide and maintain a working environment in which his employees are not exposed to hazards existing in the workplace. This requirement includes the hazards associated with hydrocarbons spills.

It is the responsibility of ALL employees and contractors to manage hydrocarbon spills as they occur. Supervisors are accountable if their immediate areas are found to have poor hydrocarbon management practices (this includes the clean-up of minor spills).

Spills involving hydrocarbons have the potential to produce adverse consequences to human health and/or the environment. Environmental spills can lead to contamination of water (both surface and aquifers), soil and habitats. The effect is higher closure costs, loss of a potable resource, death of flora and fauna, requirement for remediation, classification into Western Australia's Contaminated Sites database and prosecution by the Department of Environment and Conservation (DEC).

This safety practise outlines:

- Action required when a spill is identified
- Techniques to restrict the extent of the contamination
- Techniques to collect spilled material
- Techniques to collect and dispose of contaminated material
- Techniques to treat soils contaminated by hydrocarbon
- Reporting requirements in regard to hydrocarbon spills

REQUIREMENTS

1 Action required when a spill is identified

1.1 Isolate the spill area

1.2 Identify the spilt substance

1.3 Identify hazards and PPE requirements – consult the appropriate MSDS.

1.4 If safe to do so, the source of the spill should be restricted or stopped (i.e. shutdown machinery, switch off pumps, close valves).

1.5 If suitable equipment is readily available and can be operated in a safe manner, the extent of the spill is to be contained.

1.6 Contact immediate Supervisor as soon as possible and advise of spill.

2 Techniques to restrict the extent of the contamination

2.1 If possible restrict the source of the spill to ensure the flow of hydrocarbon is stopped.

2.2 If the spill is occurring outside a containment bund, use earthmoving equipment to construct additional earthen bunds to contain the extent of the flow.

2.3 Isolate drains.

2.4 On advice of Environmental Department, pump source material from either or both of the source container or the bunded containment into a safe container.

3 Techniques to collect spilled hydrocarbon

3.1 On advice of Environmental Department, pump source material from either or both of the source container or the bunded containment into a safe container.

3.2 Use absorbent materials to soak up residual hydrocarbon.

3.3 If the spill occurs in an area where a water body has become contaminated, use mini air booms to contain the spread of hydrocarbon on the surface of the water.

3.4 Use a skimmer to collect contained hydrocarbon in a triple oil separator or retain on the surface of the water body and pump to a waste oil tank or other safe container.

3.5 Hydrocarbon absorbents are to be collected and disposed of as decided by the Environmental Department and according to site requirements.

4 Techniques to treat soils contaminated by hydrocarbon

4.1 Dependent on site requirements and on advice from the Environmental Department, contaminated soils may be treated in the following ways:

- Collected and disposed of
- Encapsulated in the waste dump
- Collected or remain in situ and treated by bioremediation to breakdown the hydrocarbon.

4.2 On completion of the rehabilitation program the Environmental Department must inspect and verify that the spill has been successfully remediated.

5 Reporting requirements in regard to hydrocarbon spills

5.1 All incidents of hydrocarbon spills are to be reported to the immediate Supervisor as soon as possible and followed up with the completion of the B&J Catalano Incident Report Form which requires an incident investigation to determine root cause and assists in the prevention of a reoccurrence.

5.2.1 The immediate Supervisor must then report the incident to the Environmental Department to determine what reporting to external departments is required i.e. Department of Conservation.

Table 1: Suggested Spill Equipment

Type of Spill	Recommended Spill Equipment
Spill on rocks / dirt	• Use earthen bunds or booms to contain spill • Polypropylene pads to mop up excess oil at the outset • Global Peat or Enretec to treat contaminated soil in-situ
Spill on concrete / hardstand area e.g. workshop	• Polypropylene pads (easiest and quickest) • Floorsorb / kitty litter if pads not available (this must be swept up and disposed of in hydrocarbon bins immediately, as these products are not hydrophobic and will not contain the spill if they become wet)
Spill in containment bund	• Polypropylene pads or pillows • Bund can be drained or sucked out to waste oil receptacle if the spill is large
Spill occurs when raining or on a water body	• Polypropylene pads

RELATED DOCUMENTS

a. B&J Catalano Incident Report Form

REFERENCES

a. Occupational Safety and Health Act (WA) 1984
b. Occupational Safety and Health Regulations (WA) 1996
c. Mines Safety and Inspections Act (WA) 1994
d. Mines Safety and Inspections Regulations (WA) 1995
e. Environmental Protection Act 1986
f. Environmental Protection (Unauthorised Discharges) Regulations 2004
g. AS 1940 : 2004 Storage and handling of flammable and combustible liquids

DOCUMENT CONTROL

Approval		
Role	**Name**	**Date**
General Manager	Nunzio Giunta	Sept 2011
HSE/HR Manager	Doriann Walls	Sept 2011

Revision Events			
Rev.	**Author**	**Changes**	**Date**
1.0	Nic Henley		May 2011
2.0	Ian Prosser	Definitions / Table 1	March 2012

APPENDIX 5

DUST MANAGEMENT PLAN

LUNDSTROM ENVIRONMENTAL CONSULTANTS Pty Ltd

ACN 600 398 945

21 Sellen Court
LEEMING
WA 6149

Tel 08 9310 3297 Mob:0417934863
email: mikelund1@bigpond.com
www.Lundstrom-Environmental.com.au

DUST MANAGEMENT PLAN

Prepared for B&J Catalano Pty Ltd
For Lot 7 Runnymede Road, Wellesley
Shire of Harvey

1. INTRODUCTION

This Dust Management Plan (DMP) has been prepared in accordance with guidelines published by the Department of Environment and Conservation (DEC) (2011), now the Department of Water and Environmental Regulation (DWER) "A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities". This DMP should be read in conjunction with the report entitled "Extractive Industries Licence Application & Environmental Management Plan (EMP), Lot 7 on Diagram 40591 Runnymede Road, Wellesley, prepared for B&J Catalano, March 2020".

The objectives of this DMP are as follows:

- To describe the nature of the proposed operation
- To identify any sources of dust that might arise from these operations
- To identify the proximity of any sensitive premises in this regard
- To identify measures that will limit the generation of dust from the operations
- To identify measures that will limit the impact of dust on sensitive premises

2. SITE BACKGROUND

2.1 Locality

Lot 7 Runnymede Road, Wellesley, Shire of Harvey.

2.2 Ownership

B, C & S Catalano

2.3 Land Use

The property has historically been used for the grazing of livestock and for quarrying.
Figure 1 illustrates the land use of the property and its immediate surrounds

2.4 Geology and Soils

The property is covered by grey and yellow sands of the Spearwood System comprising mainly dunes and dune ridges. The sand reaches a maximum thickness of 18 meters and is underlain by sandy clays of the Guildford Formation and limestones of the Tamala Formation.

The topsoil is approximately 500mm thick and comprises mainly fine to medium sand.

Particle size distribution test results in Annexure 1 show that the sand has the following texture:

Coarse, medium and fine sand:	98%
Silt:	2%
Clay:	0%

Although there will be some uplift of the finer particle component of this soil during stripping and stockpiling operations, this will be limited due to the low proportion of fines. During strong winds the potential exists for fine particles to become airborne especially when they are disturbed by excavation activities and further discussion on mitigation measures in this regard is contained in section 4 below.

2.5 Potentially Sensitive Receptors

2.5.1 Residential Dwellings

The positions of closest residential dwellings are shown on Figure 1 with details listed in Table 1.

Table 1: Residential Dwellings within 1500m of the Site

Reference No. (Figure 1)	Lot No.	Occupants Name	Distance to closest area of proposed pit (meters)
Res 1	101	G.P. Reading	649
Res 2	111	P. W Ivankovich – listed as owner but not sure if occupier	827
Res 3	22	LandCorp	647

2.6 Prevailing Winds

As winds are strongest in this area in the afternoon, data has been extracted for this time. The wind speed and direction data utilised is from the Bunbury weather station, within 20km of the site. These data show that prevailing winds are predominately from the west with occasional winds from the south-west and north-west. Winds from the north, south and east occur less than 10% of the time (Bureau of Meteorology 2016).

3. PROPOSED WORKS AND POTENTIAL IMPACTS

B&J Catalano propose to extract a total of approximately 160,000m^3 of sand from two additional areas; an area of 1.97ha immediately to the east of the existing pit (~70,000m^3) and the northern batter of the existing pit adjoining Lot 21 (~90,000m^3) as shown in Figure 1.

It is estimated that the existing approved resource (15.61ha) has 80,000m^3 remaining. The additional resource created by this application will thus make a total available resource from this site of approximately 240,000m^3. Annual extraction will be approximately 50,000m^3 per annum, this may vary depending on the demand for sand.

It is intended to rehabilitate 2.61ha to native vegetation and the remainder of the disturbed area back to pastures. Table 2 provides a description of all activities, their duration, aspect and an assessment of potential for dust impacts.

Table 2: Aspects and Impacts of Dust Generating Activities

Activity	Duration	Aspect	Impact
Topsoil Stripping and stockpiling of new EIL area and remainder of existing pit.	2 weeks in 2021	Disturbance of grass and soil exposes ground to wind erosion	Dust may create an amenity issue with nearby residents
Rehabilitation (including existing pit)	1 week per annum over 5 year period	Disturbance of topsoil could release dust into the atmosphere	Dust may create an amenity issue with nearby residents
Loading of trucks from workface	4 years at an average of 16 trucks per day	Loading of sand may release dust into the atmosphere	Fine dust may create an amenity issue with nearby residents
Transport of sand from site	4 years	Dust could escape from the truck in transit	Amenity, health or traffic safety issue

3.1 Plant and Equipment to be used

The list of Equipment to be used is as follows:

Caterpillar 980 and 950 front end loaders
Finlay Screen 693
Striker 25m Stacker
Caterpillar generator set

3.2 Summary of Mining Actions

The following Table outlines the proposed mining actions:

Table 3: Stages of the Mining Operation

Stage	Action	2017	2018	2019	2020	2021	2022	2023	2024	2025
PAST OPERATIONS										
1	Remove topsoil and stockpile									
1	Extract sand by loader & truck									
2	Remove topsoil and stockpile									
2	Extract sand by loader & truck									
3	Remove topsoil and stockpile									
3	Extract sand by loader & truck									
1	Rehabilitate Stage 1									
2	Rehabilitate Stage 2									
3	Rehabilitate Stage 3									
Infill planting	2.28ha native vegetation									
Revegetation	2.61ha native vegetation									
PROPOSED OPERATIONS										
New Extraction Area and Existing Pit Batter	Clearing of approx. 10 trees									
	Remove topsoil and stockpile									
	Extract sand by loader & truck									
	Rehabilitate									

3.3 Site Risk Assessment and Classification

The site risk assessment is based on the format provided in Appendix 1 of the DEC guideline document "A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities" (March 2011) referred to in Section 1 of this DMP. Based on the risk assessment conducted the classification derived is "low risk". Measures for managing dust impacts are discussed in Section 4 below.

4. Measures Proposed for Managing Dust

This report has identified the potential dust generating activities associated with the proposed development and has also identified the potentially sensitive receptors. The measures that are proposed to manage dust impacts are listed below:

- A 15kl water cart will be on site during all periods when earth is being moved or screening is being conducted. If dust is generated during these periods, the water cart will be employed to damp down the areas of concern.

- If the wind is blowing strongly from the south in the direction of the closest residences and conditions are dusty, operations will be stopped until such time as adequate wetting down has occurred.

- A polymer-based spray-on soil stabilizer will be applied to topsoil and overburden stockpiles if they do not stabilize by crusting and grass regrowth.

- Truck loads will always be covered so that no dust is generated in transit.

- A complaints system will be put in place and these will be recorded by the Quarry Manager and acted on promptly.

- A notice will be erected at the front gate and this will provide emergency contact details for the Quarry Manager.

5. REFERENCES

Bureau of Meteorology. Wind data for Bunbury 1995-2010 (Accessed from www.bom.gov.au November 2016)

Department of Environment and Conservation, 2011. A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities.

6. ATTACHMENTS

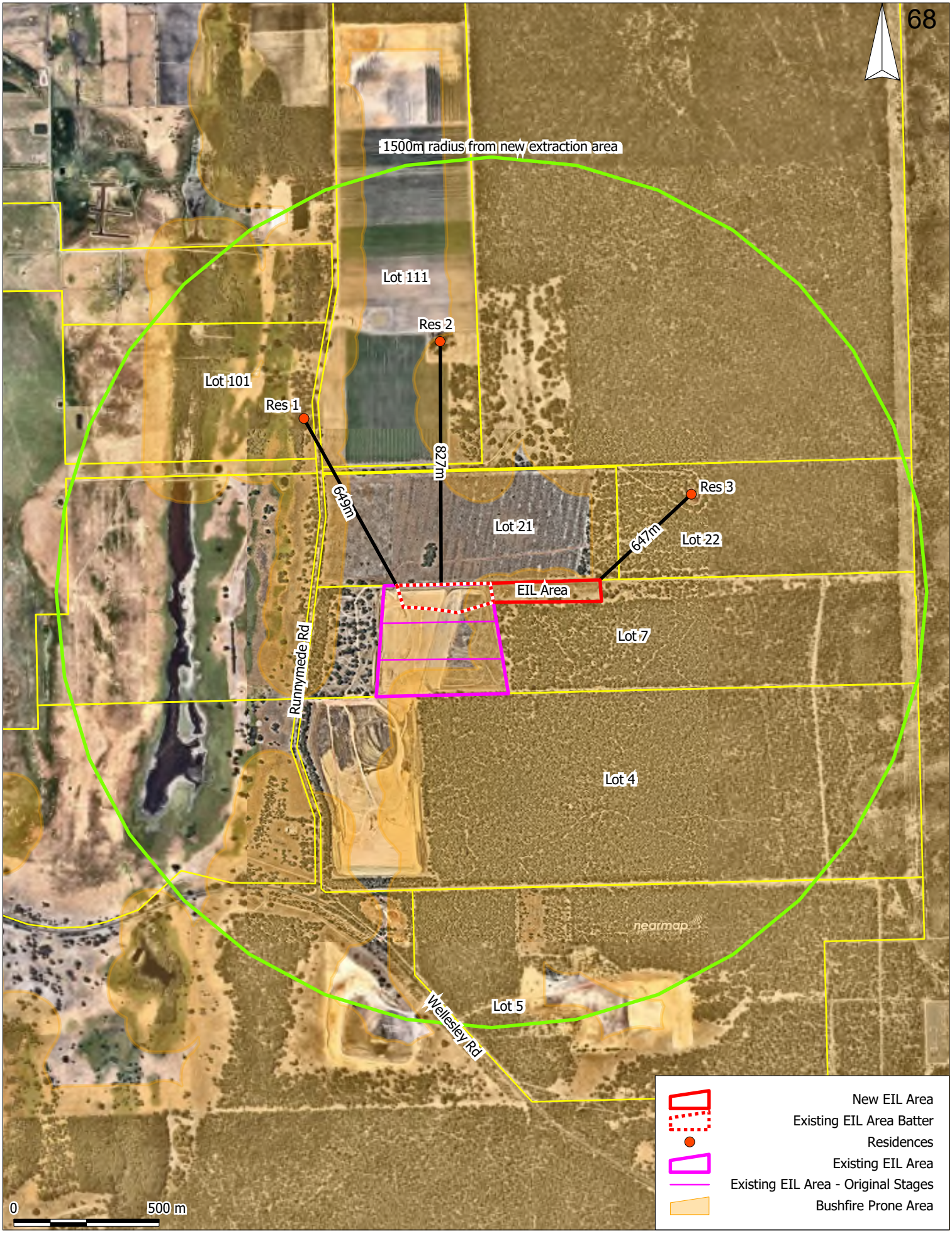
FIGURES

Figure 1 Site and Surrounds

ANNEXURES

Annexure 1 Particle Size Distribution Test

FIGURES



Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863
mikelund1@bigpond.com

Scale: 1:16000
Original Size: A4
Air Photo Source: Nearmap Dec 2019
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Rd Wellesley

Figure 1: Site and Surrounds

ANNEXURE 1

Particle Size Distribution Test

GEOTECH
Geotech Materials Testing Services, ABN: 48 137 480 034
Karemmi Pty. Ltd. ABN: 94 078 149 425
51-55 Forrest Avenue, Bunbury 6230 WA
Telephone: (08) 9721 6255 Facsimile: (08) 9721 6455
Email: quality@geotechsoil.com.au

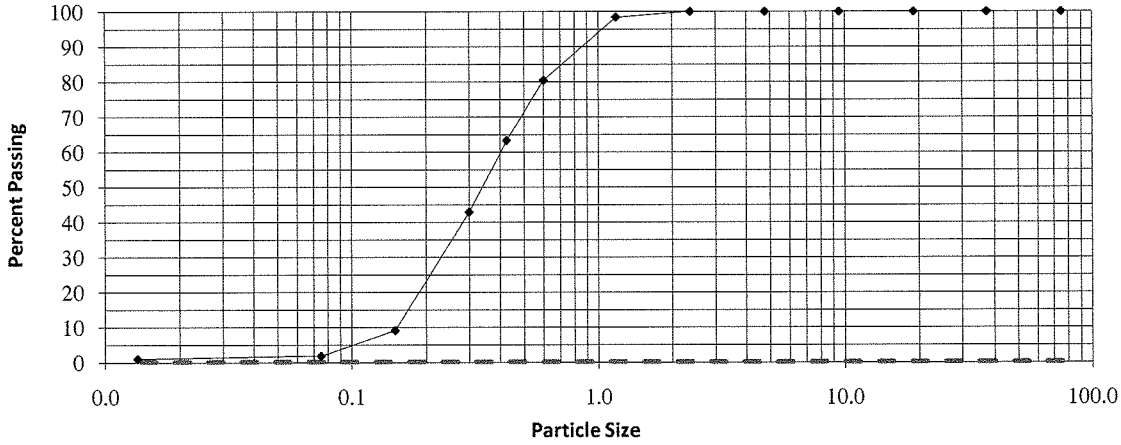
Bunbury Base Lab
NATA SR#5029
13a Leichardt Street, Bunbury WA 6230
(08) 9725 6034
bunburylab1@geotechsoil.com.au

TEST CERTIFICATE
PARTICLE SIZE DISTRIBUTION
TEST METHOD - WA 115.1

Sample No: BBY-4831-1 **Date Tested:** 4831-1
Tested By: J.Perkins, J.Perkins

Client: B&J Catalano Pty Ltd
Project: Sand Compliance
Project Location: Runnymede Pit R-1
Material Description: Sand
Sampled By: Client Sample date: -
Sampling Method: Sampled by client. Sample prepared in accordance with WA 105.1.
Field Site #: 1 Chainage: - Offset: - Offset from: -

Particle Size Distribution



Sieve Size (mm)	Percent Passing
75.0	100
37.5	100
19.0	100
9.5	100
4.75	100
2.36	100
1.18	98
0.600	80
0.425	63
0.300	43
0.150	9
0.075	2
0.0135	1

Largest sieve size used: 75.0 Percent Retained 0

Note(s): This document is issued in accordance with NATA's accreditation requirements.
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Approved Signatory: _____ **Date:** 22-Mar-11
S.McMahon

(c) Geotech

GEOTECH
Geotech Materials Testing Services, ABN: 48 137 480 034
Karemmi Pty. Ltd. ABN: 94 078 149 425
51-55 Forrest Avenue, Bunbury 6230 WA
Telephone: (08) 9721 6255 Facsimile: (08) 9721 6455
Email: quality@geotechsoil.com.au

Bunbury Base Lab
NATA SR#5029
13a Leichardt Street Bunbury WA 6230
(08) 9725 6034
bunburylab1@geotechsoil.com.au

TEST CERTIFICATE
TEST FOR LINEAR SHRINKAGE
TEST METHOD - WA 123.1

Lab Prefix:	BBY		**Date Tested:** 18-Mar-11
Sample No:	**4831-2**		**Tested By:** H.Dellaca
Client:	B&J Catalano Pty Ltd		Test Request: –
Project:	Sand Compliance		
Project Location:	Runnymede Pit R-1		
Material Description:	Sand		
Sampled By:	Client		Sample date: –
Sampling Method:	Sample supplied by Client, and prepared in accordance with WA 105.1.		
Field Site #:	1 Chainage: –	Offset: –	Offset from: –

(WA 123.1)
Linear Shrinkage (%): **0.0**

Specimen Condition: Normal

Sample Preparation: Oven Dried
Dry Sieved

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Approved Signatory: _____ **Date:** 22-Mar-11
S.McMahon

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APPENDIX 6

DIEBACK MANAGEMENT PLAN

LUNDSTROM ENVIRONMENTAL CONSULTANTS Pty Ltd
ACN 600 398 945

21 Sellen Court
LEEMING WA 6149

Mob:0417934863
email: mikelund1@bigpond.com
www.Lundstrom-Environmental.com.au

DIEBACK MANAGEMENT PLAN
Prepared for B & J Catalano Pty Ltd
Lot 7 Runnymede Road, Wellesley
Shire of Harvey

1. INTRODUCTION

The purpose of this Dieback Management Plan (DMP) is to describe the measures that will be taken to limit the risk of spread of Dieback disease as a result of sand extraction on Lot 7 Runnymede Road, Wellesley. This DMP should be read in conjunction with the report entitled "*Extractive Industries Licence Application and Environmental Management (EMP), Lot 7 on Diagram 40591 Runnymede Road, Wellesley, March 2020*" prepared for B & J Catalano Pty Ltd by Lundstrom Environmental Consultants Pty Ltd.

2. SITE BACKGROUND

2.1 Property Description, Ownership and Locality

Locality:	Lot 7 on Diagram 40591 (Runnymede Road, Wellesley, Shire of Harvey)
Ownership:	B, C & S Catalano

The property is located approximately 2km to the east of Forrest Hwy, 23km north of Bunbury.

2.1 Land Use

The property is currently used for sand extraction. Lot 4 adjoining it to the south is also operated by B&J Catalano for sand extraction. Main Roads proposes to establish a sand quarry on Lot 21 adjoining the property to the north. Other properties surrounding the proposed operation are mainly used for grazing.

Figure 1 shows the land use of the property and its immediate surrounds.

2.2 Geology and Soils

The entire property is covered by grey and yellow sands of the Spearwood System comprising mainly dunes and dune ridges. The sand reaches a maximum thickness of 20 metres and is underlain by sandy clays of the Guildford Formation and limestone of the Tamala Formation.

2.3 Vegetation

The eastern half of the property is located in an area mapped as Heddle Vegetation Complex - Bassendean Complex-Central and South. It is described as vegetation ranging from woodland of *Eucalyptus marginata* (jarrah) – *Allocasuarina fraseriana* (sheoak) – *Banksia spp*. to low woodland of *Melaleuca spp.* and sedgelands on the moister sites. (WALGA 2020).

The middle of the property lies in an area mapped as Karrakatta Complex-Central and South. It is described as predominantly open forest of *E. gomphocephala – E. marginata- E. calophylla* (tuart-jarrah-marri) and woodland of *E. marginata – Banksia spp.* (WALGA 2020).

The proposed new EIL area comprises mostly of pasture grasses and is cleared of native vegetation except for approximately 10 trees for which a clearing permit has been applied. No other native vegetation will require clearing.

3. PROPOSED WORKS

B&J Catalano propose to extract a total of approximately 160,000m3 of sand from two additional areas; an area of 1.97ha immediately to the east of the existing pit (~70,000m3) and the northern batter of the existing pit adjoining Lot 21 (~90,000m3) as shown in Figure 1.

It is estimated that the existing approved resource (15.61ha) has 80,000m3 remaining. The additional resource created by this application will thus make a total available resource from this site of approximately 240,000m3. Annual extraction will be approximately 50,000m3 per annum, this may vary depending on the demand for sand.

It is intended to rehabilitate 2.61ha to native vegetation and the remainder of the disturbed area back to pastures.

Proposed mining actions are as follows:

- The active area will be stripped of topsoil, which will be placed in stockpiles within the extraction area.
- Within the active cell sand will be excavated using a front-end loader and bulldozer. Trucks will enter the pit from via Runnymede Road to be loaded from the stockpile by a front-end loader.
- It is anticipated that excavation beneath the old EIL batter will proceed until a level of 9.0 m AHD has been reached so it is level with the existing pit.
- The depth of the excavation within the new EIL area is constrained by the fact that the entire area needs to serve as a batter to the Main Roads pit on Lot 21. Excavation will only proceed until a minimum of 16 m AHD is reached in the north western corner. The final landsurface will slope upwards to the north eastern corner which will have final of elevation of 33 m AHD.
- Batters of 1:6 (vertical: horizontal) will be achieved at the completion of landsurface rehabilitation.

4. DIEBACK STATUS OF THE AREA

Dieback mapping has not been undertaken for the site. No obvious signs of dieback infestation were observed in the uncleared vegetation surrounding the proposed extraction area. Since the majority of the area within which the extraction is to be undertaken has been completely cleared, the status of this area could not readily be ascertained. On the basis of this, the site should be classified as uninterpretable and managed as such.

Guidelines for the management of the pit and the movement of vehicles in and out of the pit are contained in the Dieback Working Group guideline document (Dieback Working Group 2010).

4.1. Proposed Dieback Management Measures

The following management measures will be put in place to minimise future spread of dieback:

- The property will be fenced at all times.
- Access to the property will be via a single entrance gate.
- All machinery, trucks and other vehicles will arrive in a clean condition free of soil and organic matter that may contain dieback fungus.
- Any soil and plant material brought to the site for rehabilitation purposes should be from dieback free sources.
- The site will not be worked during wet periods.
- Employees and contractors working on the site will be informed of the purpose of the above measures and their responsibilities in relation to dieback prevention.

At the entrance to the property, a gate is installed and will be sign-posted: “CLEAN ON ENTRY, NO UNAUTHORISED ENTRY”, Vehicles must be free of soil before passing beyond this point”. All B & J Catalano vehicles will be cleaned down at their depot in Brunswick Junction before entering this property for the first time, after leaving another pit. Any outside contractors coming in will have to ensure that their vehicles are cleaned off-site.

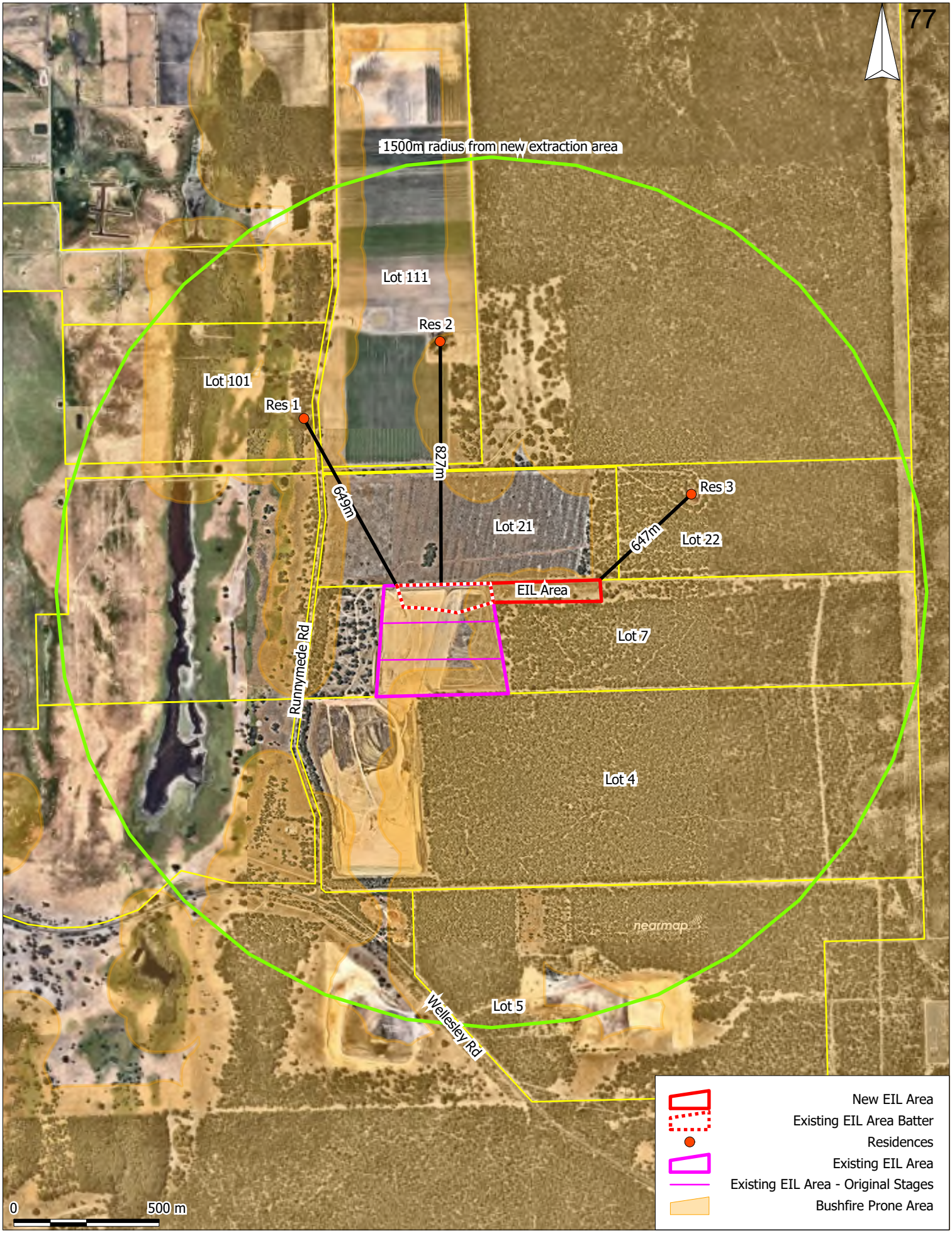
An information brochure explaining dieback management guidelines is handed out to all new customers of B & J Catalano. This information brochure states that the extracted material is considered to be ‘uninterpretable’ and may therefore contain *Phytophthora* Dieback and that the extracted material should not be used in areas adjoining any vegetation which is known to be susceptible to *Phytophthora* Dieback. It also includes a list of vegetation that are potentially susceptible to *Phytophthora* dieback. The information brochure is contained in Annexure 1.

6. REFERENCES

Dieback Working Group (2010). Management of *Phytophthora* Dieback in Extractive Industries. Best Practice Guidelines. Available on www.dec.wa.gov.au

WALGA (2020). Environmental Planning Tool (EPT). [Online], http://lbp.asn.au/index_public.html. Accessed January 2020.

FIGURES



Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863
mikelund1@bigpond.com

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Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Rd Wellesley

Figure 1: Site and Surrounds

ANNEXURE 1

Dieback Information Brochure

PHYTOPHTHERA DIEBACK AND EXTRACTIVE INDUSTRIES INFORMATION BROCHURE

for

B&J Catalano

Staff, Customers and Clients

What is *Phytophthora* (*cinnamomi)* Dieback?

Phytophthora dieback is a soil-borne fungal pathogen that kills a wide range of plant species in the southwest of WA by destroying their root systems. There are over fifty species of *Phytophthora* that occur worldwide. Although most *Phytophthora* species can cause plant disease, *Phytophthora cinnamomi* is the most frequently isolated *Phytophthora* species from native plant communities in WA' south west.

Impact of *Phytophthora* Dieback

Phytophthora Dieback occurs in all Southern Australian States and has had a significant impact on the biodiversity of native plants and animals from WA. It sometimes occurs in the nursery, mining, and forestry industries in WA.

According to CALM (2003), a conservative estimate places approximately 15-20% of the Jarrah forest as infested by *Phytophthora cinnamomi*. Furthermore, approximately 60% of the shrubland, *Banksia* woodland and Mallee woodland in the Stirling Range National Park are infected by the pathogen. Similarly, 70% of the *Shannon* and *D'Entrecasteaux.* National Parks are also affected by *Phytophthora cinnamomi.*

Managing *Phytophthora* Dieback

The movement of large volumes of soil is a significant risk in terms of spreading *Phytophthora cinnamomi*. The extractive industry has the opportunity to reduce the rate of spread of *Phytophthora cinnamomi* by taking steps to minimise the accidental spread of the pathogen, with extraction in the >400 mm rainfall zone at greatest risk of spreading the pathogen.

In particular, operations occurring near native plant communities dominated with *Banksia* species and other Proteaceae may be at high risk. Different types of extracted materials have their different levels of inherent risk with regards to the likelihood of being infested with *Phytophthora* Dieback and therefore these differences need to be taken into account. For example, sand and gravel which carries organic matter or topsoil can be infested *with Phytophthora*, whereas limestone and hard rock are normally always dieback free.

Plants Susceptible to *Phytophthora* Dieback

Banksias, Adenanthos and other Proteaceae*, Grass Trees (Xanthorrhoea), Lomandra, Hibbertia, Dasypogon, Patersonia,* Jarrah *(Eucalyptus marginata)* are highly susceptible to Phytophthora impacts, as are 2,300 native plant and some exotic plants (Shearer 2004). The Dieback Working Group site provides a list of susceptible species. On the other hand species such as Marri *(Corymbia calophylla)* are not affected.

Disturbed native vegetation, farmland, urban and other similar areas are not normally able to be assessed for *Phytophthora.*

Should you have concerns with the use of particular gravels next to or high quality native vegetation please contact B & J Catalano for further advice or view https://www.dwg.org.au.

Best Practice Management Techniques

are described by the Dieback Working Group[1] and these are used by B & J Catalano to minimise the risk of their operations in acting as a vector for the transfer of the pathogen. The techniques described in this document are by no means all- encompassing but provide a summary.

B & J Catalano choose resources that are elevated, dieback free or have species not favoured by *Phytophthora* such as blue gum plantations and pasture, where best practice is possible. Resources are extracted, processed managed and tested to provide the lowest possible *Phytophthora* Risk.

Summary of Best Practice

Guidelines for a site entirely infested with *Phytophthora* Dieback

- Entirely dieback infested sites are only used to supply to similarly infested sites.

Guidelines for *Phytophthora* free, excluded from assessment or partially impacted sites.

- Training of staff on Phytophthora Dieback and management.
- No unauthorised entry is permitted.
- Vehicles must be “clean on entry”
- Areas are identified as follows:
  - Extraction and processing areas
  - Roads, including haul roads
  - Turn around points
  - Hygiene – quarantine points
  - Storage and stockpile areas
  - Water sources
- Surface water is contained on site.
- Stockpile areas are hard and well drained.
- All vehicles are clean on exit.
- The site and activities are secured by fencing, Signage, training and other methods.
- Separate excavation and loading areas.
- Signs illustrate the status and measures required are used as applicable.
- Dieback free water is used.
- Customers are notified of the Dieback status of the site and the resource.
- Stockpiles are regularly checked for organic matter or topsoil contamination.
- Product is regularly tested for *Phytophthora.*

B&J Catalano

South Western Highway Brunswick 6224
PH: 08 9726 8120
admin@catalano.com.au

ISO 14001 certified Equal Assurance · ISO 9001 certified Equal Assurance · AS 4801 certified Equal Assurance · JAS-ANZ

INFORMATION FOR THIS BROCHURE HAS BEEN OBTAINED FROM:

[1]Dieback Working Group, 2019. Management of *Phytophthora* Dieback in Extractive Industries.

Flora and Vegetation Survey Report (v0.2)

LOT 7 RUNNYMEDE ROAD, WELLESLEY

REPORT PREPARED BY
LUNDSTROM ENVIRONMENTAL CONSULTANTS PTY LTD

Lot 7 Runnymede Rd, Wellesley

Flora and Vegetation Survey Report

Version Reference: 0.2

Date: 19 March 2019

Prepared by Lundstrom Environmental Consultants Pty Ltd for B&J Catalano Pty Ltd

Lundstrom Environmental Consultants Pty Ltd
Telephone: 08 9310 3297
Email: mike@lundstrom-environmental.com.au
Web: https://www.lundstrom-environmental.com.au

B&J Catalano Pty Ltd
Telephone: 08 9726 8100
Email: peterbennett@catalano.com.au
Web: https://www.catalano.com.au/

Version Register

Version No.	Description	Author	Reviewed by	Date
0.1	Internal draft	M. Carey	S. Challwell, P. Aylmore & M. Lundstrom	14 March 2019
0.2	Final draft	M. Carey	M. Lundstrom	19 March 2019

Front cover image: *Eucalyptus marginata, Agonis flexuosa* and *Banksia attenuata* over *Hibbertia hypericoides, Melaleuca thymoides* and *Dasypogon bromeliifolius*

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GLOSSARY

BAM Act	*Biosecurity and Agriculture Management Act 2007* (Western Australian Government)
BC Act	*Biodiversity Conservation Act 2016* (Western Australian Government)
BoM	Bureau of Meteorology
DAFWA	Department of Agriculture and Food Western Australia – superseded, now DPIRD (Western Australian Government)
DBCA	Department of Biodiversity, Conservation and Attractions (Western Australian Government)
DEC	Department of Environment and Conservation – superseded, now DBCA (Western Australian Government)
DEE	Department of the Environment and Energy (Australian Government)
DMIRS	Department of Mines, Industry Regulation and Safety (Western Australian Government)
DoW	Department of Water - superseded, now DWER (Western Australian Government)
DPIRD	Department of Primary Industries and Regional Development (Western Australian Government)
DRF	Declared Rare Flora
DWER	Department of Water and Environmental Regulation (Western Australian Government)
EPA	Environmental Protection Authority (Western Australian Government)
EP Act	*Environmental Protection Act 1986* (Western Australian Government)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Australian Government)
ESA	Environmentally Sensitive Area
LEC	Lundstrom Environmental Consultants
MNES	Matters of National Environmental Significance
PEC	Priority Ecological Community
TEC	Threatened Ecological Community
TPF	Threatened and Priority Flora
WALGA	Western Australian Local Government Association
WC Act	*Wildlife Conservation Act 1950* (Western Australian Government) superseded, now BC Act (Western Australian Government)
WONS	Weeds of National Significance

EXECUTIVE SUMMARY

B&J Catalano Pty Ltd (Catalano) is proposing to extract sand at Lot 7 Runnymede Road, Wellesley. Lundstrom Environmental Consultants (LEC) was commissioned by Catalano to undertake a detailed flora and vegetation assessment of the proposal area.

Lot 7 Runnymede Rd, an 80.2ha property currently zoned as 'General Farming', is located approximately 130km south of Perth and 24km north of Bunbury, within the Shire of Harvey, Western Australia (WA).

A single-phase detailed (formally level 2) flora and vegetation assessment was carried out by a team of botanists, taxonomists and field technicians between the 18th and 20th of September 2018. A targeted search for threatened and priority flora, such as *Caladenia speciosa*, was also conducted during this time.

The assessments for flora and vegetation (including Banksia woodland TEC) were recorded and reported in accordance with relevant technical guidelines and standards. Key findings of the assessments within the study area are as follows:

The key findings, conclusions and recommendations arising from the flora and vegetation assessment within the Survey Area are as follows:

- A total of 81 taxa from 63 genera and 34 families were identified in the Survey Area.
- Of the 81 taxa recorded, nine taxa were introduced flora (weeds) and 72 were native species (88.9% of taxa recorded).
- The commonly occurring families were Fabaceae and Myrtaceae (with 5 taxa each), Orchidaceae (7 taxa), as well as Asparagaceae and Asteraceae (with 8 taxa each).
- No Threatened flora under the BC Act or under the EPBC Act were recorded.
- Three Priority flora as listed by DBCA (2018a) were recorded in the Survey Area: *Millotia tenuifolia* ?var. *laevis* (P2); *Lasiopetalum* ?*membranaceum* (P3); and *Acacia semitrullata* (P4). The *Millotia* and *Lasiopetalum* species could not be identified with certainty, as they were either sterile or the flowering material was immature, but the identifications provided are the most likely outcome.
- No weed species recorded are listed as Declared Pests under the BAM Act or WONS.
- One vegetation type, mainly in 'Excellent' condition, was described and mapped within the Survey Area: *Banksia attenuata - Eucalyptus marginata* open woodland over a *Hibbertia hypericoides – Melaleuca thymoides* low open shrubland over a herbland of *Dasypogon bromeliifolius.*
- The vegetation of the Survey Area was consistent with FCT 21a, which although not listed as a PEC under WA State Policy (DBCA 2019), is consistent with the Commonwealth EPBC Act listed Banksia Woodlands TEC.

1 INTRODUCTION

1.1 BACKGROUND

B&J Catalano Pty Ltd (Catalano) is proposing to extract sand at Lot 7 Runnymede Road, Wellesley. Lundstrom Environmental Consultants (LEC) was commissioned by Catalano to undertake a detailed flora and vegetation assessment of the proposal area.

1.1.1 Location, Ownership and Tenure

Lot 7 Runnymede Road is located approximately 130km south of Perth within the Shire of Harvey (Figure 1), Western Australia (WA). The property is situated 2.5km east of Forrest Highway, 6km east of the coast at Binningup and approximately 24km north of Bunbury.

The 80.2ha property is owned by B, C & S Catalano and is currently zoned as 'General Farming' under the Shire of Harvey Town Planning Scheme No. 1.

The cleared western portion of the property was most recently used for sand extraction. The majority of properties surrounding Lot 7 are used for grazing, however Lot 4 (on the southern boundary of Lot 7) is currently operated by B&J Catalano for sand extraction.

1.1.2 Survey Area

The eastern portion of Lot 7 contains a continuous patch of remnant vegetation (approximately 50ha). The 16ha Survey Area is located on the western edge of this remnant vegetation patch, immediately adjacent to the partially cleared portion of Lot 7 (Figure 2).

Remnant vegetation is located directly north, west and south of the Survey Area, and the previous extraction area (currently under rehabilitation) lies to the west.

1.2 OBJECTIVE AND SCOPE

The objective of this report was to describe the vegetation and flora, provide information on the occurrence of conservation significant flora and to map and assess the environmental values of the vegetation within the Survey Area at Lot 7 Runnymede Road, Wellesley.

The scope of work included the following tasks:

- Review relevant literature and data for species and communities listed within Commonwealth and State Legislations and departmental databases.
- Conduct field surveys, including the use of quadrats and targeted searches, at a suitable time to locate species and vegetation identified through literature reviews and database searches.
- Identify and map all potential occurrences of conservation significant species and communities within the Survey Area.
- Delineate and characterise the flora and range of vegetation types in the Survey Area; and
- Assess and map the vegetation condition in the Survey Area

1.3 GUIDANCE AND LEGISLATION

1.3.1 Survey Guidance

The Environmental Protection Authority (EPA) provides guidance on flora and vegetation surveys to ensure that adequate data are obtained to an appropriate standard: *Technical Guidance - Flora and Vegetation surveys for Environmental Impact Assessment* (EPA 2016).

The guidance document provides advice on:

- survey preparation and desktop study;
- determining the type of survey required;
- sampling techniques and survey design; and
- data analysis and reporting.

1.3.2 Flora and Vegetation Protection

Flora and vegetation are protected by a range of legislative and non-legislative instruments. A short description of these is provided in Table 1. Definitions for categories of conservation significant species and ecological communities are provided in Section 2.3 and Section 2.4 respectively.

Table 1. Flora and vegetation protection - Legislation and Guidance

Legislation and Guidance	Description
COMMONWEALTH	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act aims to protect Matters of National Environmental Significance (MNES), which includes Threatened Ecological Communities (TECs) and Threatened Species (DEE 2018a, DEE 2018d). Under the EPBC Act, the Commonwealth Department of the Environment and Energy (DEE) lists threatened species and communities in categories determined by criteria set out in the Act (www.environment.gov.au/epbc/index.html). Projects likely to cause a significant impact on MNES should be referred to the DEE for assessment under the EPBC Act.
Weeds of National Significance (WONS)	The Australian Government along with the State and Territory governments has endorsed 32 WONS, each of which has a national strategy. WONS must be reported and are regarded the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts.
WA STATE	
Biodiversity Conservation Act 2016 (BC Act)	The BC Act came into effect in January 2019 to provide for the conservation and protection of biodiversity and biodiversity components in WA; replacing the *Wildlife Conservation Act 1950* (WC Act). The Department of Biodiversity, Conservation and Attractions (DBCA) lists flora and ecological communities under the provisions of the BC Act as protected according to their need for protection (DBCA 2018a). Flora may be Declared Rare when populations are geographically restricted or are threatened by local processes. The BC Act also provides

Legislation and Guidance	Description
	for the statutory listing of WA Threatened Ecological Communities (TECs) by the Minister for Environment (DBCAb). Under the BC Act, by Notice in the WA Government Gazette of 9 October 1987 (WC Act), all native flora (spermatophytes, pteridophytes, bryophytes and thallophytes) are also protected throughout the State.
Environmental Protection Act 1986 (EP Act)	Threatened Flora and TECs are given special consideration in environmental impact assessments and have special status as Environmentally Sensitive Areas (ESAs) under the EP Act and the Environmental Protection (Clearing of Native Vegetation) Regulations 2004. Exemptions for a clearing permit do not apply in an ESA. Refer to Section 2.3.2 for further information on Threatened Flora and Section 2.4.4. for more information on TECs.
Biosecurity and Agriculture Management Act 2007 (BAM Act)	Pests may be 'Declared' by the Minister for Agriculture under the BAM Act. The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under BAM Act. A declaration may apply to the whole State, to districts, individual properties or even to single paddocks. If a plant is 'Declared', landholders are obliged to control that plant on their properties (DAFWA 2015). Refer to Section 2.3.3 for further information on Declared Pest Plants.
DBCA Priority Lists	The DBCA lists 'Priority' flora that have not been assigned statutory protection as Declared Rare or 'Scheduled' under the BC Act (DBCA 2018a). Flora assessed as Priority 1-3 are in urgent need of further survey. Priority 4 flora require monitoring every 5-10 years and Priority 5 flora are subject to a specific conservation programme (Section 2.4). The DBCA also maintains a list of Priority Ecological Communities (PECs) which identifies ecologically valuable communities that need further investigation before possible nomination for TEC status (DBCA 2019). Refer to Section 2.3.2 for further information on Priority Flora and Section 2.4.4. for more information on PECs.
Informal Recognition of Flora	Certain populations or communities of flora may be of local significance or interest because of their patterns of distribution and abundance (i.e. range extensions or unusual species composition). Many species are also in decline because of threatening processes (land clearing, grazing, changed fire regimes), and relict populations of such species assume local importance for the DBCA.

2 METHODS

2.1 DESKTOP ASSESSMENT

The purpose of the desktop assessment is to gather contextual information and to identify potential flora and vegetation prior to the field survey.

2.1.1 Physical environment

A desktop assessment was undertaken of the physical factors of the region and the local area, including climate; geology; land systems; soils; hydrology and hydrogeology. Unusual or restricted geological features (e.g. outcropping, distinctive soil types or hydrological features) were identified and targeted during the survey as they may support significant/unique flora and vegetation to the area.

Database searches included GeoVIEW (Geology 1:50,000, DMIRS 2018), Bureau of Meteorology (Climate Data Online, BoM 2019), Acid Sulphate Soil Risk Map (DWER-055), Soil Landscape Mapping (DPIRD-027), Soil Landscape Mapping - Systems (DPIRD-064), as well as aerial photography and satellite imagery.

2.1.2 Flora

An evaluation of flora known within the area was undertaken to help develop an understanding of dominant flora species, typical families and potential diversity. The desktop flora assessment output consisted of an inventory of known and/or expected flora species within the Survey Area based on the following database searches:

- EPBC Act listed Threatened Flora (DEE 2018a)
- DBCA's threatened and priority flora databases (DBCA 2018c)
- NatureMap custom reports of recorded species in the locality (DBCA 2018d)
- FloraBase (Western Australian Herbarium 2018)
- Survey reports or references in the region or locality.

2.1.3 Vegetation

An evaluation of known and likely vegetation within the Survey Area was based on an assessment of regional and local mapping and databases, including:

- Statewide Vegetation Mapping (Beard 1968-1981, Beard 1972-1980 and Beard *et al.* 2005)
- Regional vegetation mapping (Heddle *et al*. 1980)
- EPBC Act List of Threatened Ecological Communities (Protected Matters Search Tool, DEE 2018b)
- DBCA threatened and priority ecological communities' databases (DBCA 2018e)
- Recovery Plans and other reports/documents containing information on the preferred habitats and distributions of TECs of relevance to the Study Area (i.e. DEE 2016 – a guide on Banksia Woodlands of the Swan Coastal Plain)
- Survey reports or references in the region or locality.
- General environmental databases to identify environmental values of the area and further site characteristics:
    - GeoVIEW to identified geology types for the Survey Area (DMIRS 2018)
    - National Map (Commonwealth of Australia 2018)

- Environmental Planning Tool (WALGA 2018)
- Locate (via SLIP and Landgate) (Government of Western Australia 2018a)

2.2 FIELD ASSESSMENT

EPA (2016) describes three survey types for Environmental Impact Assessment:

- *Reconnaissance Survey:* A reconnaissance survey provides context and gathers broad information about a Survey Area. Generally, a reconnaissance survey is required where flora and vegetation values are well defined, the area is not likely to support significant flora or vegetation and the scale and nature of potential impacts are not likely to be significant.
- *Targeted Survey:* A targeted survey gathers comprehensive information on significant flora and/or vegetation. A targeted survey aims to determine the size and extent of all significant flora populations or vegetation in the Survey Area and to place any impacts into context.
- *Detailed Survey:* A detailed survey provides adequate local and regional context relative to the values of the flora and vegetation within the Survey Area. A detailed survey requires comprehensive survey design that considers optimal survey timing, disturbance events and supplementary survey requirements. Multiple sampling events may also be necessary.

The Detailed Survey was considered the most appropriate survey type this assessment, as the Survey Area supports a relatively high biodiversity and it may contain significant flora or vegetation. The Detailed Survey includes a series of sampling techniques, as described in Sections 2.2.2 – 2.2.5 below.

2.2.1 Timing and expertise

Field surveys were undertaken between the 18th and the 20th of September 2018. This period was selected to coincide with the optimum flowering period for many of the species of the region, in particular the targeted conservation significant orchids such as *Caladenia speciosa*.

Field assessments were undertaken by a team comprising of botanists, taxonomists and field technicians, all with botanical survey experience across WA. A summary of the team is provided in Table 2.

Table 2. Experience and Competence

Shane Chalwell (Plant Ecology)	
Qualifications	PhD (Plant Ecology)
Scientific Licence	SL012223
Experience	Shane Chalwell is a highly qualified and skilled consulting botanist with extensive experience in vegetation surveys and monitoring throughout Western Australia. His expertise in plant community ecology includes the design of broad and fine scale vegetation mapping, vegetation health and rehabilitation monitoring programs, wetland condition assessments, and searches for Threatened and Priority flora. Shane was team leader during the field assessment, coordinated field surveys, and undertook data analysis.
Frank Obbens (Bushtech Consultancy)	
Qualifications	BSc Honours (1ST) (Biology/Plant Science)
Scientific Licence	SL012278
Experience	Frank, a research associate with the WA Herbarium, has provided botanical services for over 20 years, including botanical identification, taxonomic investigation services and field support. He has been involved with many detailed flora and vegetation surveys, threatened and priority flora searches, vegetation mapping surveys, rehabilitation monitoring as well as flora identifications and specific

	taxonomic investigations. Frank is also an expert on the genus *Calandrinia* and has published several papers. Frank was a field botanist during surveys and undertook plant identification of the collected plant specimens.
Sharna Yates (Thomson)	
Qualifications	BSc (Botany/Plant Science)
Scientific Licence	SLO12477
Experience	Sharnya Yates (Thomson) is a specialised plant taxonomist and field botanist with over15 years' experience in the field and an extensive knowledge WA's vascular plants. She has undertaken a wide variety of ecology related projects such as detailed flora surveys, targeted threatened, rare and priority flora surveys, base line flora and vegetation assessments, vegetation monitoring, plant taxonomy and arid region ecology projects. Sharnya was a field botanist during surveys and undertook plant identification of the collected plant specimens.
Daniel Marsh	
Qualification	BSc (Biological Science)
Scientific Licence	SL012308
Experience	Daniel is an experienced ecologist and field botanist working in all aspects of flora and vegetation surveys throughout WA. Daniel was a field botanist during surveys.
Michelle Carey (Lundstrom Environmental)	
Qualifications	PhD (Environmental Science)
Scientific Licence	SLO12385
Experience	Michelle has over 20 years' experience in environmental monitoring and investigations across WA. She has experience with field assessments, project planning, data analysis and reporting. Michelle assisted Shane with field logistics, provided field support during targeted searches and prepared the survey report.

2.2.2 Quadrats

Quadrat sampling is the most appropriate technique for determining and describing vegetation during detailed vegetation surveys. Eight 10m x 10m quadrats were installed across one single vegetation type, based on desktop assessment and field reconnaissance. A full description of each quadrat is presented in Appendix 1. Information collected in each quadrat included:

- site code;
- location, with GPS coordinates (estimate of their accuracy) and datum;
- size and shape of quadrat;
- photograph/s from north-west corner;
- landform and soil description;
- dominant growth form, height, cover and species for the three traditional strata (upper, mid and ground) compatible with NVIS Level V (NVIS Technical Working Group, 2017);
- any other location information that might be useful in vegetation classification including slope, aspect, litter, fire history, vegetation/landform/soil correlations;
- assessment of vegetation condition and description of disturbances;

- a comprehensive species list, including weeds; and
- quadrat marking method.

2.2.3 Targeted search

A search was undertaken to target significant flora and vegetation with the potential to occur in the Survey Area, based on findings from the desktop study.

A transect width of 10m (equating to a 5m search area either side of the walked transect) was traversed throughout the entire Survey Area.

The following data was recorded along the traverse:

- a descriptive location;
- GPS coordinates and datum;
- targeted species or community data per vegetation type boundary/potential quadrat location (dependant on purpose of traverse);
- landform; aspect;
- soils;
- vegetation condition;
- period since the last fire;
- description of disturbances; and
- any apparent correlation between vegetation and landform features.

2.2.4 Opportunistic sampling

Flora not recorded in quadrats were recorded and collected opportunistically as the Survey Area was traversed. When a potentially unrecorded species was found, the location was noted using a GPS waypoint and a reference photograph was recorded. The general site conditions were also noted (i.e. soil type, associated flora, cover, distribution and other general notes).

2.2.5 Vegetation condition rating

The condition of vegetation was assessed and mapped across the Survey Area using the vegetation condition scales outlined in Keighery (1994). A description of the condition scale is summarised in Table 3.

Table 3. Vegetation Condition Scale (adapted from Keighery 1994)

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.

Condition	Description
	Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.

2.3 FLORA ANALYSIS

2.3.1 Identification of specimens

Identification of specimens was undertaken using taxonomic keys, comparison with herbarium reference specimens and consultation with taxonomic experts in the field and via external contacts (WA State Herbarium).

2.3.2 Conservation significant flora

Flora within WA that is under threat may be classed as either Threatened Flora or Priority Flora. Where flora has been gazetted as Threatened Flora under the BC Act, it is an offence "to take" such flora without the written consent of the Minister. The BC Act states that "to take" flora includes to gather, pluck, cut, pull up, destroy, dig up, remove or injure the flora or to cause or permit the same to be done by any means.

Priority Flora constitute species considered to be under threat, but for which there is insufficient information available concerning their distribution and/or populations to make a proper evaluation of their conservation status. Such species are considered to potentially be under threat, but do not have legislative protection afforded under the BC Act. The DBCA categorises Priority Flora according to their conservation priority using four categories as described in. Table 4 sets out definitions of both Threatened and Priority Flora.

At the Commonwealth level, under the EPBC Act, Threatened Flora can also be listed as Vulnerable, Endangered, Critically Endangered, Conservation Dependent, Extinct in the Wild, or Extinct by the Minister for the Environment. Under the EPBC Act, a person must not take an action that has or will have a significant impact on a listed threatened species without approval from the Commonwealth Minister for the Environment.

Table 4. Conservation Codes for WA Flora (DBCA 2018a)

Conservation Code	Description and rating
THREATENED FLORA	
T (Threatened Flora)	Specially protected under the BC Act, listed under Schedules 1, 2 and 3 of the Wildlife Conservation (Rare Flora) Notice (which may also be referred to as Declared Rare Flora). Taxa which have been adequately searched for and are deemed to be, in the wild, either rare, at risk of extinction, or otherwise in need of special protection, and have been gazetted as such

	The assessment of the conservation status of these species is based on their national extent.	
	CR - Schedule 1	taxa that are extant and considered likely to become extinct or rare, as critically endangered flora, and therefore in need of special protection.
	EN -·Schedule 2	taxa that are extant and considered likely to become extinct or rare, as endangered flora, and therefore in need of special protection.
	VU - Schedule 3	taxa that are extant and considered likely to become extinct or rare, as vulnerable flora, and therefore in need of special protection.
EX (Presumed Extinct Flora)	Specially protected under the BC Act, listed under Schedule 4 of the Wildlife Conservation (Rare Flora) Notice (which may also be referred to as Declared Rare Flora). Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died and have been gazetted as such. Threatened flora are ranked according to their level of threat using IUCN Red List categories and criteria. For example, *Acacia splendens* is specially protected as Declared Rare Flora under the BC Act and is a threatened species with a ranking of Critically Endangered	
	EX - Schedule 4	taxa that are presumed to be extinct in the wild and therefore in need of special protection.
PRIORITY FLORA		
P1 (Priority One): Poorly known species	Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations, but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.	
P2 (Priority Two): Poorly known species	Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations, but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.	
P3 (Priority Three): Poorly known species	Species that are known from several locations, and the 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. Species may be included if they are comparatively well known from several locations, but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.	
P4 (Priority Four): Rare, Near Threatened and other species in need of monitoring	(a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands.	

	(b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
	(c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

2.3.3 Declared (Plant) Pest Organisms

Section 22 of the BAM Act makes provision for a plant taxon to be listed as a declared pest organism in respect to parts of, or the entire State. According to the BAM Act, a declared pest is defined as a prohibited organism (Section 12), or an organism for which a declaration under section 22 (2) of the Act is in force.

Under section 26 (1) of the BAM Act, a person who finds a declared plant pest must report, in accordance with subsection (2), the presence or suspected presence of the declared pest to the Director General or an inspector of the DPIRD.

Under the Biosecurity and Agriculture Management Regulations (2013), declared plant pests are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Appendix 2). According to Section 30 (3) of the BAM Act, the owner or occupier of land, or a person who is conducting an activity on the land, must take the prescribed control measures to control the declared pest if it is present on the land.

2.4 VEGETATION ANALYSIS

2.4.1 Vegetation description

The National Vegetation Information System (NVIS) (NVIS Technical Working Group, 2017) is the nationally adopted classification system used for vegetation description for EIA in Western Australia.

The description of each vegetation unit represents the entire area and the level of variability within and between vegetation units has been assessed and described.

Broadly, the vegetation classification uses vegetation structure and dominant species to describe differences between vegetation units. Structural vegetation classification provides information on height of strata, foliar cover and dominant species.

Local scale vegetation units have been described at NVIS Level V. The term “Vegetation Type” should is used to describe local scale vegetation units and “Vegetation Association” and “Vegetation Complex” are used to describe vegetation at the state and regional scale respectively. The hierarchy and scale of vegetation classification systems as described in this report is:

- Vegetation Association (NVIS III)- Structural form and dominant species (1:1,000,000 -to 250,000)
- Vegetation Complex (NVIS IV)– structural and floristic description linked to geomorphology (1:250 000 to 1:100 000)
- Vegetation Type (NVIS V)- Floristic definition by strata with structural detail. Often represented with a code and floristic description (1:100 000 to 1:10 000).

2.4.2 Floristic community type analysis

The remnant vegetation of the southern Swan Coastal Plain was surveyed by Gibson *et al.* (1994) to provide an understanding of the major floristic gradients across the region. The major plant communities (or Floristic Community Types, FCTs) were defined by classifying the data according to the similarities in species composition between plots. When determining the FCT of a new record, a floristic analysis of species composition provides the most robust method that is consistent with the original classification.

Presently, a single consistent method for the determination of FCTs for vegetation data in the Swan Coastal Plain is not available. Therefore, it is preferable to use multiple methods and compare the output for the most likely result. All analyses described below were undertaken using 'R' environmental software, specifically its packages 'Cluster', 'Vegclust' and 'Vegan' (https://www.r-project.org/).

2.4.2.1 Hierarchical Clustering

Hierarchical agglomerative clustering is the usual first stage in classifying vegetation data into community types. This involves calculating the similarity (or more often, the dissimilarity) between plots within the dataset and then sequentially fusing the plots into groups according to their similarity. This type of method was used in the analysis of the original Swan Coastal Plain dataset (Gibson *et al.* 1994), but its use as the basis for assigning new plot data to the regional classification has some drawbacks.

Firstly, a hierarchical clustering only applies to the relationships between plots, and the relative distances between them, within that particular dataset. The addition of new data often alters the relative distances and disrupts the clustering output. Secondly, as an unsupervised method, hierarchical clustering does not define rules for the membership of the defined groups, and so the addition of new plots requires the rebuilding of the entire hierarchy (De Cáceres and Wiser 2012).

The data for the Swan Coastal Plain regional survey (Gibson *et al.* 1994) was downloaded from the NatureMap website. This is largely similar to the original survey except for one site (OATES-1), which has now been excluded. The species nomenclature of the original dataset was updated to be consistent with current usage. Where original names could not be matched clearly to the updated usage, those taxa were removed from the analysis. The data from the plots of Lot 7 and Lot 4 Runnymede Rd surveys (undertaken concurrently) was added to the matrix both together and also one plot a time, which served to remove any effect of spatial correlation between the new plots. Each new dataset was then analysed calculating the Bray-Curtis distance coefficient (or resemblance measure) and the flexible beta linkage method (beta = -0.1). Assignment of the Runnymede Rd plots was to the nearest distinct group by inspection of the resulting dendrogram.

2.4.2.2 Non-hierarchical clustering

Non-hierarchical clustering methods often allow new plot data to be added to previous classifications because they are based on the concept that each group or cluster is represented by a prototype i.e. either a centroid or a medoid (a 'type' plot) (De Cáceres and Wiser 2012). Therefore, new observations can be assigned to an existing classification by calculating the distance to the nearest prototype (which may be considered a membership criterion). This approach is to be preferred to the hierarchical reconstruction approach because it defines numerical rules that can be consistently applied. However, it also means the original classification needs to be re-analysed using a different method, which can be problematic because not all sites from the original classification may be diagnostic for their respective clusters.

For the analysis of the Runnymede Rd data, the same updated Swan Coastal Plain dataset was used as for the hierarchical clustering analysis. After calculating a Bray-Curtis distance matrix, the dataset was then analysed using Fuzzy C-Means clustering in the R package 'Vegclust'. A fuzziness coefficient of 1.1 was chosen to minimise influence from noisy data points. FCTs with too few plots to reliably define determine a prototype (e.g. FCT 14 with two plots) were removed from the analysis. Similarly, some plots that were regularly being misclassified (such as those from clusters with large internal heterogeneity) were also removed. The final dataset consisted of 344 plots with 1316 taxa representing 38 FCTs. Each site of the Runnymede Rd data was then assigned a FCT using function 'vegclass' in the Vegclust package.

It should be noted that this approach for FCT assignment is preliminary and will need to be refined further before it can be used consistently. For example, the assignment of sites to dryland FCTs gives robust and consistent results. Sampling of seasonally-inundated wetlands, however, often gives problematic results as these floristic types show a greater degree of floristic overlap between groups and/or require additional sampling to provide a clearer differentiation between such groups. Also, disturbed sites with a high proportion of introduced taxa often give spurious results.

2.4.3 Conservation significant vegetation

An ecological community is defined as a naturally occurring biological assemblage that occurs in a particular type of habitat composed of specific abiotic and biotic factors.

At the State level, ecological communities may be considered Threatened once they have been identified as such by the WA Threatened Ecological Communities Scientific Advisory Committee. A TEC is defined under the EP Act as an ecological community listed, designated or declared under a written law or a law of the Commonwealth as threatened, endangered or vulnerable. There are four categories of TEC, as described in Table 5. Some State TECs are also listed as Threatened under the Commonwealth EPBC Act.

Ecological communities identified as threatened, but not listed as TECs, can be classified as Priority Ecological Communities (PECs). These communities are under threat, but there is insufficient information available concerning their distribution to make a proper evaluation of their conservation status. DBCA uses five categories of PEC according to their conservation priority, as described in Table 5.

Table 5. Conservation Codes for WA Vegetation (DEC 2013)

Conservation Code	Description and rating
Threatened Ecological Community (TEC)	A community is one which is found to fit into one of the following categories; “presumed totally destroyed”, “critically endangered”, “endangered” or “vulnerable”.
presumed totally destroyed	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.
critically endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated
endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
vulnerable	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.
Priority Ecological Community (PEC)	Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Conservation Code	Description and rating
Priority One	Poorly-known ecological communities. Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha).
Priority Two	Poorly-known ecological communities. Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha).
Priority Three	Poorly known ecological communities (i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or; (iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.
Priority Four	Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.
Priority Five	Conservation Dependent ecological communities

3 DESKTOP ASSESSMENT RESULTS

3.1 PHYSICAL ENVIRONMENT

3.1.1 Climate

The Survey Area is in the south-west of WA and experiences a temperate climate with dry, hot summers and cool, wet winters.

The Bureau of Meteorology (BoM) Wokalup Station (Site No.9642), is within 12km of the Survey Area and has up to 65 years of records (1951-2019) (Table 6). Data from the Wokalup station indicates the mean maximum temperature ranges from 16.7°C in July to 31.0°C in January, and the mean minimum temperature ranges from 7.9°C in July to 16.1°C in February. The mean annual rainfall is 936.2mm (BoM 2019).

Table 6. Climate statistics. Bureau of Meteorology, Wokalup Station (Site No. 9642).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Temperature (°C)													
Mean max.	31.0	30.8	28.3	24.2	20.2	17.5	16.7	17.1	18.7	21.1	24.0	28.1	23.1
Mean min.	15.5	16.1	14.8	12.7	10.6	9.0	8.0	7.9	8.5	9.4	11.4	13.7	11.5
Rainfall (mm)													
Mean	14.5	15.3	20.7	51.4	134.6	180.5	182.6	134.3	95.8	57.7	35.7	15.3	936.2

3.1.2 Geology, landforms and soils

The Survey Area is located within the Swan Coastal Plain (SCP). The SCP represents the Quaternary surface of the Perth Basin and lies in a 30km wide band between the coast and the Darling Scarp, extending approximately 600km from Geraldton to Dunsborough (Playford *et al.* 1976).

The landform of the SCP is characterised as low-lying coastal plains, often swampy, with sand hills consisting mainly sandy, yellow soils (Beard 1990).

The Survey Area lies within the Spearwood dune geomorphic unit of the SCP (Figure 3). The Spearwood system is described as dune ridges with deep siliceous yellow brown sands or pale sands with yellow-brown subsoil.

The sand reaches a maximum thickness of 20 metres and is underlain by sandy clays of the Guildford Formation and limestone of the Tamala Formation.

A search of the Acid Sulphate Soil (ASS) risk map for the Swan Coastal Plain identified the area to be outside any mapped risk polygons.

3.1.3 Hydrology

The Survey Areas lies within the Coastal Catchment of the Harvey River Basin and does not fall within a Public Drinking Water Source Area (Western Australian Land Information System [WALIS] 2017).

The Site is within the Rights in Water and Irrigation Act (RIWI) Groundwater Proclamation Area (South West Coastal Groundwater Area), but outside any RIWI Act Surface Water Management Areas.

Locally, there are no defined drainage lines within the extraction area as drainage occurs by infiltration into the porous sand surface. There is no expression of surface water within the Survey Area.

3.1.4 Hydrogeology

The Survey Area is within the Bunbury trough of the Southern Perth Basin (DoW 2009).

Based on an evaluation of information provided by the Department of Water, together with data on static water elevation obtained from the drill log of a private bore sited on the adjoining Lot 4, groundwater occurs at an average of 7mAHD, with an annual variation of approximately 1 meter. Groundwater flow is towards the Mialla Swamp to the west.

3.2 VEGETATION

3.2.1 Regional Vegetation Mapping

The Survey Area lies within the Drummond Botanical Sub-district of the Darling Botanical District, which falls within the Southwest Botanical Province (Beard 1980) and is recognised as having a very high degree of species diversity.

The Drummond Botanical Sub-district is characterised by Banksia woodland on leached sands with Melaleuca swamps; woodlands of tuart (*Eucalyptus gomphocephala*), jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) (Beard, 1990). Dominant plant families of the Drummond Botanical Sub-district include Proteaceae, Myrtaceae and Fabaceae.

3.2.2 Biogeographic Regionalisation (IBRA 7)

The Biogeographic Regionalisation of Australia (IBRA) divides Australia into 89 bioregions based on major biological and geographical/geological attributes. These bioregions are subdivided into 419 subregions, as part of a refinement of the IBRA framework. The Survey Area is situated in the Perth subregion (SWA02) of the Swan Coastal Plain IBRA bioregion (DEE 2018; Thackway and Cresswell 1995) (Figure 4).

The Perth subregion (SWA02) is composed of colluvial and aeolian sands, alluvial river flats, coastal limestone. It comprises of Heath and/or Tuart woodlands on limestone, Banksia and Jarrah-Banksia woodlands on Quaternary marine dunes of various ages, and Marri on colluvial and alluvials and also includes a complex series of seasonal wetlands (Mitchell *et al.* 2002).

3.2.3 Pre-European vegetation

As discussed in Section 2.4.1, state and regional scale vegetation classification systems are described in terms of “Vegetation Association” and “Vegetation Complex”:

- Vegetation Association (NVIS III)- Structural form and dominant species (1:1,000,000 -to 250,000)
- Vegetation Complex (NVIS IV)– structural and floristic description linked to geomorphology (1:250 000 to 1:100 000)

In Western Australia, the datasets that map native vegetation occurring prior to European settlement at both a Vegetation Association and Vegetation Complex scale are described below:

- State wide Vegetation Association mapping is based on published and unpublished mapping of J. S. Beard at 1:250,000 scale (Beard 1990 and Beard *et al.* 2005).
- Vegetation Complex mapping for the south-west of Western Australia:
  - 1:250,000 Swan Coastal Plain Vegetation Complexes (Heddle *et al.* 1980) as updated by Webb *et al.* (2016)
  - 1:50,000 Mapping of vegetation complexes in the South West Forest Region of Western Australia (Mattiske and Havel 1998) as updated by Webb *et al.* (2016).

3.2.3.1 Vegetation Association

The Survey Area is supported by the Spearwood_6 vegetation association, which is broadly described as a medium woodland; tuart and jarrah (Beard *et al.* 2005; Government of Western Australia 2018b). The vegetation association of the Survey Area (within the Swan Coastal Plain) and its remaining extent in WA and the Swan Coastal Plain is presented in Table 7 and Figure 5.

Table 7. Pre-European Vegetation Extent (Source: Beard *et al.* 2005, Government of Western Australia 2018b)

Veg. Association and Ref No.	Extent Context	Pre–European Extent (ha)	Current Extent (ha)	% Pre European Extent Remaining	% Current Extent Protected (IUCN I –IV)
Spearwood_6	Swan Coastal Plain	56,343ha	14,579ha	25.8%	12.9%

Source: Government of Western Australia (2018b)

3.2.3.2 Vegetation Complex

Vegetation complexes are patterns of vegetation at a regional scale, and are based on factors such as landform, soil and climate.

The vegetation complex of the Survey Area is part of the "Karrakatta Complex – Central and South", which is described as 'predominantly open forest of *Eucalyptus gomphocephala – E. marginata- E. calophylla* and woodland of *E. marginata – Banksia* spp.' (Webb *et. al* 2016).

The remaining extent of the vegetation complex of the Survey Area is presented in Table 8 and Figure 6.

Table 8. Vegetation Complex extent summary

Veg. Complex	Extent Context	Pre–European Extent (ha)	Current Extent (ha)	% Pre European Extent Remaining
Karrakatta Complex – Central and South	Swan Coastal Plain	2,178.42ha	2,143.61ha	98.4%

Source: Webb *et. al* (2016)

3.2.4 Threatened and Priority Ecological Communities:

According to various databases, the entire Survey Area has been mapped as a community that is likely to contain Banksia Woodlands of the Swan Coastal Plain ecological community, an Endangered TEC listed as under the EPBC Act. A summary of the database search results, including the likely presence of TECs, is presented in Appendix 3.

Field assessments were used to confirm the presence of the TEC within the Study area.

3.2.5 Environmentally Sensitive Areas and Wetlands

There are no Environmentally Sensitive Areas (ESA) as defined by the Native Vegetation Clearing Regulations within the Survey Area. The two closest ESAs are located approximately 1.8km west and 1km east of the Survey Area and are both associated with conservation category wetlands.

The nearest Ramsar Wetland, the Peel-Yalgorup System (Australian Ramsar Site No. 36), is approximately 5.8km north west of the Survey Area.

3.3 FLORA

3.3.1 Conservation Significant Flora

Database searches of NatureMap (DBCA 2018d), the DBCA Threatened and Priority Flora (DBCA 2018c), and the WA Herbarium Threatened Flora Databases Florabase (WA Herbarium 2018) as well as the DEE protected matters database (DEE 2018b) were undertaken to determine whether any Threatened or Priority flora are known from within a 5 km radius of the Survey Area. The literature review and database searches identified 21 conservation significant species in proximity of the Survey Area, representing ten Threatened Flora, nine Priority Flora and two species undetermined (*Caladenia georgei* x *speciosa*; *Caladenia paludosa* x *speciosa*) (Figure 7). Of the 21 conservation significant species recorded, six (two Threatened Flora; and four Priority Flora) were recorded within approximately 2km from the Survey Area:

- *Acacia semitrullata* (P4)
- *Boronia juncea subsp. Juncea* (P1)
- *Dillwynia dillwynioides* (P3)
- *Drakaea elastica* (T)
- *Drakaea micrantha* (T); and
- *Lasiopetalum membranaceum* (P3).

The list of previously recorded conservation significant species, their habitat preference and likelihood of occurrence within the Survey Area is summarised in Table 9. Analysis of the preferred habitat and soil type found that two Priority 4 species had the potential to occur within the Survey Area (*Caladenia speciosa* and *Acacia semitrullata*), with the remaining species preferring seasonally wet habitats or soil types not found in the Survey Area.

A summary of the database search results, including conservation significant flora, is presented in Appendix 3.

Table 9. Conservation significant flora occurring in proximity to the Survey Area.

Species	EPBC Act	BC Act /DBCA*	Description	Potential to occur (soil type/habitat within Survey Area)
Acacia flagelliformis		P4	Rush-like, erect or sprawling shrub, 0.3-0.75(-1.6) m high. Fl. yellow, May to Sep. Sandy soils. Winter-wet areas.	Unlikely
Acacia semitrullata		P4	A slender, erect, pungent shrub to 1.5m tall. Flowers are cream- white and visible in May to October. Habitat for this species is in white/grey sand sometimes over laterite or clay. This species occurs in sandplains and swampy areas.	Possible
Andersonia gracilis	Endangered	T	Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple, Sep to Nov. White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	Unlikely
Austrostipa bronwenae	Endangered	T	Perennial, rhizomatous grass to 1.5m tall (including flower spikes). The inflorescence is 10 to 20cm long. Flowering occurs in October through November. Fruit matures in November to December. Grows in calcareous, winter-wet grey-brown sandy-loam or dark brown loam over clay	Unlikely
Boronia capitata subsp. gracilis		P3	Slender shrub, 0.3-0.6(-3) m high, branches pilose. Fl. pink, Jun to Nov. White/grey or black sand. Winter-wet swamps, hillslopes.	Unlikely
Boronia juncea subsp. juncea		P1	Slender or straggly shrub, pedicels and sepals glabrous. Fl. pink, Apr. Sand. Low scrub.	Unlikely
Caladenia georgei x speciosa			Insufficient information available	Unlikely
Caladenia huegelii	Endangered	T	Tuberous, perennial, herb, 0.25-0.6 m high. Fl. green & cream & red, Sep to Oct. Grey or brown sand, clay loam.	Unlikely
Caladenia paludosa x speciosa			Insufficient information available	Unlikely
Caladenia procera	Critically Endangered	T	Tuberous, perennial, herb, 0.35-0.9 m high. Fl. yellow, Sep to Oct. Rich clay loam. Alluvial loamy flats, jarrah/marri/peppermint woodland, dense heath, sedges.	Unlikely
Caladenia speciosa		P4	Tuberous, perennial, herb, 0.35-0.6m high. Flowers Sep-Oct. Occurs in white, grey or black sand.	Possible
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.	Unlikely
Dillwynia dillwynioides		P3	Decumbent or erect, slender shrub, 0.3-1.2 m high. Fl. red & yellow/orange, Aug to Dec. Sandy soils. Winter-wet depressions.	Unlikely

Species	EPBC Act	BC Act /DBCA*	Description	Potential to occur (soil type/habitat within Survey Area)
Diuris drummondii		T	Tuberous, perennial, herb, 0.5-1.05 m high. Fl. yellow, Nov to Dec or Jan. Low-lying depressions, swamps.	Unlikely
Diuris micrantha	Vulnerable	T	Basal tuft of narrow, linear leaves and a loose, slender inflorescence up to 60 cm high. The yellow flowers have reddish-brown markings and are up to 1.3 cm across. Flowers appear from August to early October. It is found in small populations, on dark, grey to blackish, sandy clay-loam substrates in winter wet depressions or swamps.	Unlikely
Drakaea elastica	E	T	A slender orchid to 30 cm tall with a prostrate, round to heart shaped leaf. Singular, bright green, glossy flower. Habitat for this species is within bare patches of white sand over dark sandy loams on damp areas.	Unlikely
Drakaea micrantha	Vulnerable	T	Tuberous, perennial, herb, 0.3-0.6 m high. Fl. yellow & brown, Sep to Oct. Brown loamy clay. Winter-wet swamps, in shallow water.	Unlikely
Lasiopetalum membranaceum		P3	Multi-stemmed shrub, 0.2-1 m high. Fl. pink-blue-purple, Sep to Dec. Sand over limestone.	Unlikely
Synaphea sp. Fairbridge Farm	Critically Endangered	T	Dense, clumped shrub, to 0.3 m high, to 0.4 m wide. Fl. yellow, Oct. Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	Unlikely
Synaphea sp. Serpentine	Critically Endangered	T	Plants clumped, Spikes long, undulating, Flowers small, openly spaced, Sparsely hairy to hairless in upper 1/3 of fruit body. Occurs predominantly on flat terrain on grey-brown sandy loams to clay in seasonally wet areas.	Unlikely
Tripterococcus sp. Brachylobus		P4	Perennial herb to 0.6m with yellow flowers. Sand overlay	Unlikely

*DBCA 2018a

3.3.2 Introduced Flora

The Shire of Harvey has 47 Declared Pests listed under Section 22(2) of the BAM Act, six of which have the strongest level of control category (C2 Eradication):

- *Chondrilla juncea* (skeleton weed);
- *Pistia stratiotes* (water lettuce);
- *Prosopis glandulosa* x *Prosopis velutina* (mesquite);
- *Ulex europaeus* (gorse);
- *Xanthium spinosum* (thorny burweed); and
- *Xanthium strumarium* (sheepbur).

3.4 SOCIAL ENVIRONMENT

3.4.1 Heritage

An Aboriginal Heritage Inquiry System (Department of Planning Lands and Heritage https://maps.daa.wa.gov.au/AHIS/) identified five heritage surveys conducted over the entire (or part of the) Survey Area:

- Heritage Survey Area 104608 (1): Bunbury-Wellington Regional Planning Study: Aboriginal Heritage & Planning Survey: working paper no. 6
- Heritage Survey Area 23321 (1): Report of an archaeological and ethnographic Aboriginal Heritage Survey of Lot 4 Runnymede Road, Wellesley, Western Australia
- Heritage Survey Area 103801 (1): Report of a Survey for Aboriginal Sites, Korijekup Seismic Program. Jan.1991.
- Heritage Survey Area 104079 (1): Bunbury-Wellington Regional Planning Study: Working Paper no.6, Aboriginal Heritage and Planning Survey. [Open] Released for Public Comment July 1992.
- Heritage Survey Area 102190 (1): Report on Aboriginal Sites of the Lake Peel-Preston Lakelands.

According to the Aboriginal Heritage Inquiry System, no Registered Aboriginal Sites or other Heritage Places have been recorded in the Survey Area. The nearest site is “Registered Aboriginal Site 15371 – Australind: Buffalo Rd Burial”, and “Registered Aboriginal Site 16713 – Collie River Waugal” located approximately 8.2km south west of the Survey Area.

3.5 LOCAL STUDIES

Environmental studies (incorporating flora and vegetation assessments) near the Survey Area include:

- Mattiske Consulting (2003). Flora and Vegetation Survey of the Proposed Kwinana to Australind Gas Pipeline Infrastructure Corridor. Prepared for BBG and Department of Mineral and Petroleum Resources. November 2003.
- GHD (2017) Additional Area Assessment – Biological Assessment within the Kemerton Strategic Industrial Area. Memo for Albemarle Lithium Pty Ltd. October 2017.
- Ecological Australia (2017) Kemerton Industrial Area Spring Flora and Fauna Survey. Report prepared for S2V Consulting. September 2017.

4 FIELD ASSESSMENT RESULTS

4.1 LIMITATIONS AND CONSTRAINTS

There were very few constraints for this survey and all potential limitations are outlined in Table 10.

Table 10. Survey limitations

Potential limitation	Constraint	How this was addressed
Availability of contextual information at a regional and local scale	Not a constraint	Large range of reference resources was available, including vegetation association and complex information, DBCA conservation significant flora and ecological community databases (DBCA 2018c; 2018f; 2018g) as well as other studies within or near the Survey Area.
Competency/experience of the team carrying out the survey, including experience in the bioregion surveyed	Not a constraint	All botanists had extensive experience working in the south west. Refer to Section 2.2.1.
Proportion of flora recorded and/or collected, any identification issues	Not a constraint	The survey intensity was considered thorough with adequate replication of survey sites selected via pre-planned quadrat locations and opportunistic field reconnaissance. The Survey Area was easily accessible by car and the entire site could be traversed on foot.
Appropriate area fully surveyed (effort and extent)	Not a constraint	Coverage of the Survey Area is good. Site is relatively small and easy to traverse, and so entire Survey Area was mapped. High quality aerial maps were used during the survey and desktop mapping.
Access restrictions within the Survey Area	Not a constraint	Vehicle access to the Survey Area via Stanley Road and internal tracks provided no restrictions. Some foot traverse required to access southern boundary of Survey Area.
Survey timing, rainfall, season of survey	Not a constraint	Optimum flowering period following good winter rainfall in 2018. Appropriate survey time for targeted orchid species was confirmed with DBCA prior to field visit.
Disturbance that may have affected the results of survey such as fire, flood or clearing	Not a constraint	No recent major disturbance event has occurred within the Survey Area. The site was very degraded due to heavy grazing and the understory was limited.

4.2 FLORA

4.2.1 Overview

A total of 81 taxa from 63 genera and 34 families were identified in the Survey Area. Of the 81 taxa recorded, nine taxa were introduced flora and 72 were native species (88.9% of taxa recorded). The commonly occurring families were Fabaceae and Myrtaceae (with 5 taxa each), Orchidaceae (7 taxa), as well as Asparagaceae and Asteraceae (with 8 taxa each).

A flora inventory is provided in Appendix 4.

4.2.2 Threatened and Priority Flora

No Threatened species listed under the EPBC Act or gazetted as Declared Rare Flora (Threatened) pursuant to the BC Act were recorded in the Survey Area.

Three Priority flora, as listed by DBCA (2018a) were recorded in the Survey Area. The recorded Priority species included one P4 species (*Acacia semitrullata*), one P2 species (*Millotia tenuifolia* ?var. *laevis*); one P3 species (*Lasiopetalum* ?*membranaceum*) (Figure 8). The last two taxa (*Millotia* and *Lasiopetalum*) could not be identified with certainty as they were either sterile or the flowering material was immature, but the identifications provided are the most likely outcome.

4.2.3 Range extensions

The Survey Area did not represent a range extension for any of the flora recorded.

4.2.4 Introduced Flora

A total of nine introduced species, representing 11% of the total taxa, were recorded during the survey and are listed in Table 11. No species recorded are listed as Declared Pests under the BAM Act or WONS.

Table 11. Introduced flora records from the Survey Area

Species	Common name	No. of quadrats with records
Arctotheca calendula	capeweed	1
Asphodelus fistulosus	onion weed	1
Briza maxima	blowfly grass; quaking grass	4
Cotula turbinata	mayweed	1
Ehrharta longiflora	annual veld grass	2
Hypochaeris glabra	smooth cats-ear	7
Petrorhagia dubia	velvety pink	1
Ursinia anthemoides	ursinia	4
Vulpia bromoides	squirrel-tail fescue	1

4.3 VEGETATION

4.3.1 Overview

One vegetation type was described for the entire Survey Area:

> *Banksia attenuata* - *Eucalyptus marginata* open woodland over a *Hibbertia hypericoides* – *Melaleuca thymoides* low open shrubland over a herbland of *Dasypogon bromeliifolius*.

The extent of this vegetation type is mapped in Figure 8. A matrix showing species per site is also presented in Appendix 5.

4.3.2 Hierarchical analysis

The results of the hierarchical analysis show that plots either assigned themselves to FCT 21a – 'Central *Banksia attenuata* – *Eucalyptus marginata* woodlands' or FCT 21c – 'Low-lying *Banksia attenuata* woodlands or shrublands' (Table 12). The results are consistent with similarities in the presence of dominant species, however once landscape position is also considered/assessed, it is less likely that the Survey Area is consistent with FCT 21c, given the site's relatively high landscape position.

Dendrogram outputs from the analysis are shown in Appendix 6.

The plots that could not be assigned an FCT were first fused with PAGA – 6, which as a member of FCT 25 – 'Southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands'. This similarity is likely due to the presence of *Agonis flexuosa* within the site, but PAGA – 6 is a transitional plot with similarities to plots within FCTs 11, and hence has led to a misleading assignment.

Table 12. Hierarchical analysis for plots from the Lot 7 Runnymede Rd Survey Area

Site	FCT First fusion	FCT of nearest main group fusion	Possible FCT
Plot 8	25	21a	21a
Plot 9	21a	21a	21a
Plot 10	21a	21a	21a
Plot 11	21c	21c	21c
Plot 109	21c	5	21c
Plot 110	21c	5	21c
Plot 111	25	11	undetermined
Plot 112	21c	5	21c

4.3.3 Non-hierarchical analysis

The results of the FCT assignment by non-hierarchical analysis were inconclusive and are shown in Table 13. The results show the highest similarity to either a deeper wetland group (FCTs 13, 15, 16, 17) or FCT 6 for each plot, although the strengths of membership (similar to a probability) are not strong and not much greater than to other groups. This result is often due to fewer native species present within the site than those plots sampled in the Swan Coastal Plain survey. This can occur in otherwise 'Excellent' condition vegetation that has been exposed to disturbances such as increased fire regimes, altered hydrological conditions, recreational usage or grazing that may not degrade the structure of the vegetation but allow a higher degree of weed infestation and suppress some native species.

Table 13. Non- hierarchical analysis for plots from the Lot 7 Runnymede Rd Survey Area.

Plot	FCT of nearest group*	FCT of 2nd nearest group	FCT of 3rd nearest group
Plot 8	6 (32.7%)	13,15,16,17 (26.4%)	5 (10.1%)
Plot 9	6 (37.3%)	13,15,16,17 (18.8%)	5 (12.3%)
Plot 10	6 (28.5%)	5 (16.0%)	21c (13.0%)
Plot 11	6 (35.8%)	13,15,16,17 (13.2%)	21c (13.1%)
Plot 109	13,15,16,17 (29.3%)	6 (23.4%)	29/30 (19.2%)
Plot 110	13,15,16,17 (37.5%)	6 (28.0%)	29/30 (14.7%)
Plot 111	6 (41.9%)	13,15,16,17 (35.4%)	29/30 (14.9%)
Plot 112	13,15,16,17 (50.5%)	6 (28.6%)	29/30 (13.5%)

* Strength of membership shown in brackets

4.3.4 Threatened and Priority Ecological Communities

The Survey Area is considered to be consistent with FCT 21a, which is not listed as a PEC under WA State Policy (DBCA 2019).

The vegetation type within the site was also assessed for consideration as part of the Commonwealth's EPBC Act-listed TEC 'Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region' (Banksia Woodlands TEC). This TEC was gazetted in September 2016 (Commonwealth of Australia 2016).

To be considered as part of the Banksia Woodlands TEC, a patch of banksia woodland needs to meet a number of criteria:

- occurrence on the Swan Coastal Plain and immediately adjacent areas of the Whicher Scarp, Ridge Hill Shelf and Dandaragan Plateau in well-drained, low nutrient soils on sandplain landforms;
- the structure is that of a low woodland to forest;
- the canopy is commonly dominated by or co-dominated by *Banksia attenuata* and/or *Banksia menziesii*;
- the patch must include at least one of *Banksia attenuata*, *Banksia menziesii*, *Banksia ilicifolia* or *Banksia prionotes*; and
- the canopy may include emergent trees of *Eucalyptus marginata* or *Corymbia calophylla*.

The condition of the patch is also important in determining the presence of the Banksia Woodlands TEC. A patch must meet the criteria for 'Good' condition or better according to the Keighery (1994) Condition Scale (see Table 3 in Section 2.2.5). If a patch is rated as being in 'Good' condition, then it must also be at least 2 ha in size.

4.3.5 Vegetation Condition

The vegetation of the Survey Area ranged from 'Excellent' to 'Degraded', with the majority of the site in an 'Excellent' condition. An area in the west varied from 'Good' to 'Very Good' where more weeds were present and thin pockets along the northern and western boundary were in a 'Degraded' condition as they directly adjoined cleared areas.

As the majority of the vegetation of the site is in a 'Good' or better condition, it meets the criteria for inclusion within the EPBC Act listed Banksia Woodlands TEC (as described above).

Vegetation condition mapping is presented in Figure 9 and the extent described in Table 14. The average fire age of the vegetation was considered greater than three years (at least three years since last fire).

Table 14. Vegetation condition extent in the Survey Area

Condition	Quadrat records	Area (ha)	Area (%)
Excellent	6	11.3	70.8%
Very Good	1	2.6	16.3%
Good	1	1.0	6.4%
Degraded	0	1.0	6.5%

5 DISCUSSION

5.1 FLORA

Database searches identified 21 local conservation significant species, of which two Priority 4 species (*Caladenia speciosa* and *Acacia semitrullata*) were considered as potentially occurring within the Survey Area, based on location of previous records, preferred habitat and soil type.

Field surveys recorded a total of 81 taxa, 63 genera and 34 families. Nine (11%) of these taxa were weeds, none of which are WONS or Declared Pests under the BAM Act.

No Threatened species listed under the EPBC Act or gazetted as Declared Rare Flora (Threatened) pursuant to the BC Act were recorded in the Survey Area, despite targeted searches during optimum flowering times over the entire Survey Area.

Three Priority flora, as listed by DBCA (2018a) were recorded in the Survey Area: *Acacia semitrullata* (P4); *Millotia tenuifolia* ?var. *laevis* (P2); *Lasiopetalum* ?*membranaceum* (P3). Although the *Millotia* and *Lasiopetalum* species could not be identified with certainty (considered either sterile or the flowering material was immature) the identifications provided are the most likely outcome.

5.2 VEGETATION

One vegetation type was described for the Survey Area:

> *Banksia attenuata* - *Eucalyptus marginata* open woodland over a *Hibbertia hypericoides* – *Melaleuca thymoides* low open shrubland over a herbland of *Dasypogon bromeliifolius*.

The vegetation described was most similar to FCT21a, which is part of the EPBC Act Banksia Woodland TEC. The vegetation of the Survey Area ranged from 'Excellent' to 'Degraded', with the majority of the site in an 'Excellent' condition, which also meets the criteria for inclusion within the EPBC Act listed Banksia Woodlands TEC.

5.3 CONCLUSION

The key findings, conclusions and recommendations arising from the flora and vegetation assessment within the Survey Area are as follows:

- No Threatened flora under the BC Act or under the EPBC Act were recorded.
- Three Priority flora (one P2; one P3; and one P4), as listed by DBCA (2018a) were recorded in the Survey Area
- One vegetation type, mainly in 'Excellent' condition, was described and mapped within the Survey Area: *Banksia attenuata* - *Eucalyptus marginata* open woodland over a *Hibbertia hypericoides* – *Melaleuca thymoides* low open shrubland over a herbland of *Dasypogon bromeliifolius.*
- The vegetation of the Survey Area was consistent with FCT 21a, which although not listed as a PEC under WA State Policy (DBCA 2019), is consistent with the Commonwealth EPBC Act listed Banksia Woodlands TEC.

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7 FIGURES

Figure 1. Locality Plan

Figure 2. Sites and Surrounds

Figure 3. Soil Landscape System

Figure 4. Biogeographical Regionalisation of Australia (IBRA)

Figure 5. Pre-European mapping – Vegetation Association (Beard 1990)

Figure 6. Pre-European mapping – Vegetation Complex (Heddle et al. 1980)

Figure 7. Environmental Values

Figure 8. Recorded Vegetation Type and Significant Flora

Figure 9. Vegetation Condition

Lundstrom Environmental Consultants Pty Ltd

Leeming WA 6149
Mob: 0417934863
mikelund1@bigpond.com

Scale: 1:580000
Original Size: A4
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Flora and Vegetation Assessment
Location: Lot 4 Runnymede Rd Wellesley

Figure 1:

Locality Plan

Z:\Catalano\Runnymede Rd Lots 4 & 7_Wellesley_SoH_Sand\Spring 2018 Veg Survey\Drawings\F1 Locality.map 28/11/2018 Map

Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863
mikelund1@bigpond.com

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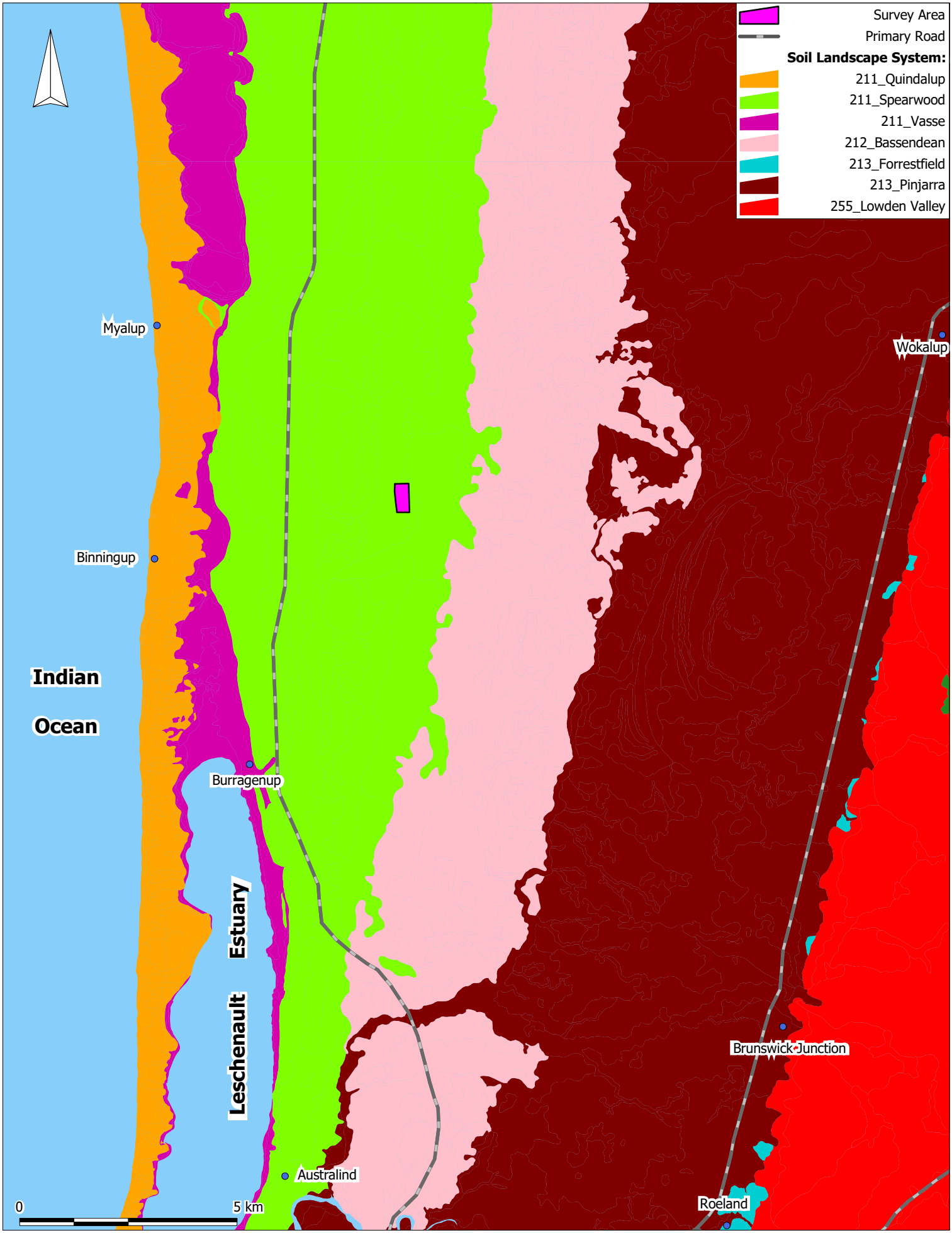
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Flora and Vegetation Assessment
Location: Lot 7 Runnymede Rd Wellesley

Figure 2: Site and Surrounds



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mikelund1@bigpond.com

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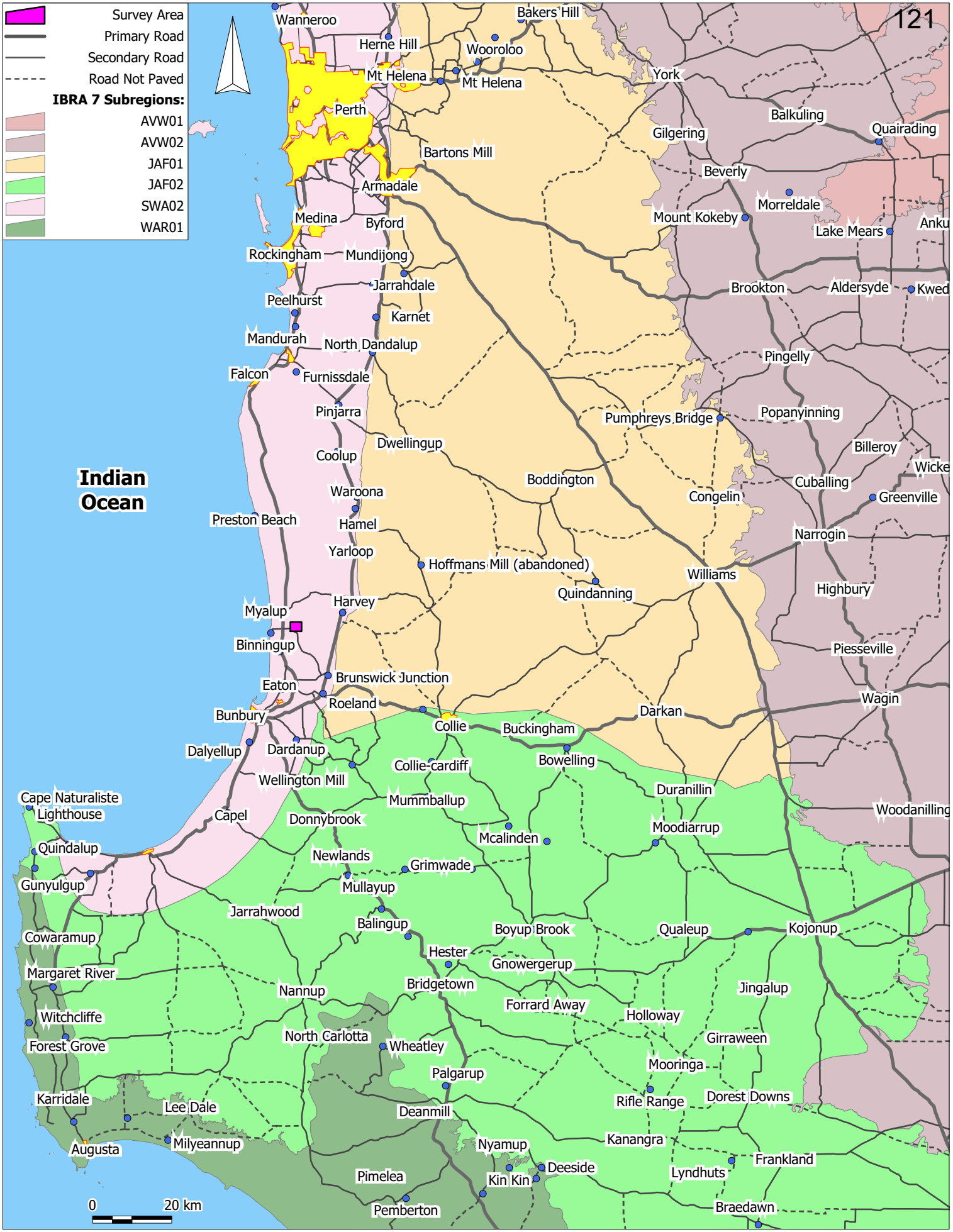
Client: B & J Catalano
Project: Flora and Vegetation Assessment
Location: Lot 4 Runnymede Rd Wellesley

Figure 3:

Soil Landscape



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mikelund1@bigpond.com

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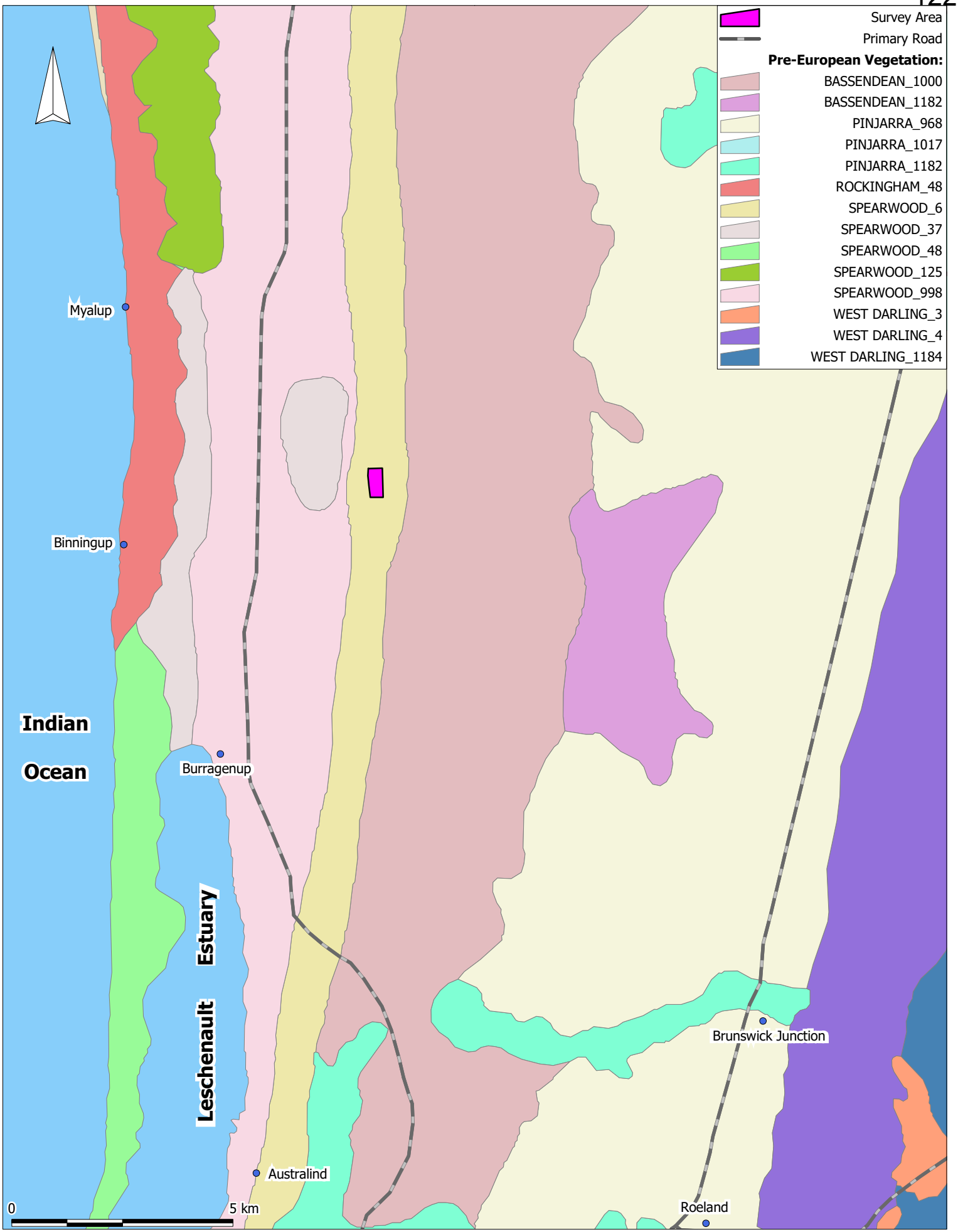
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Flora and Vegetation Assessment
Location: Lot 4 Runnymede Rd Wellesley

Figure 4: IBRA Subregions



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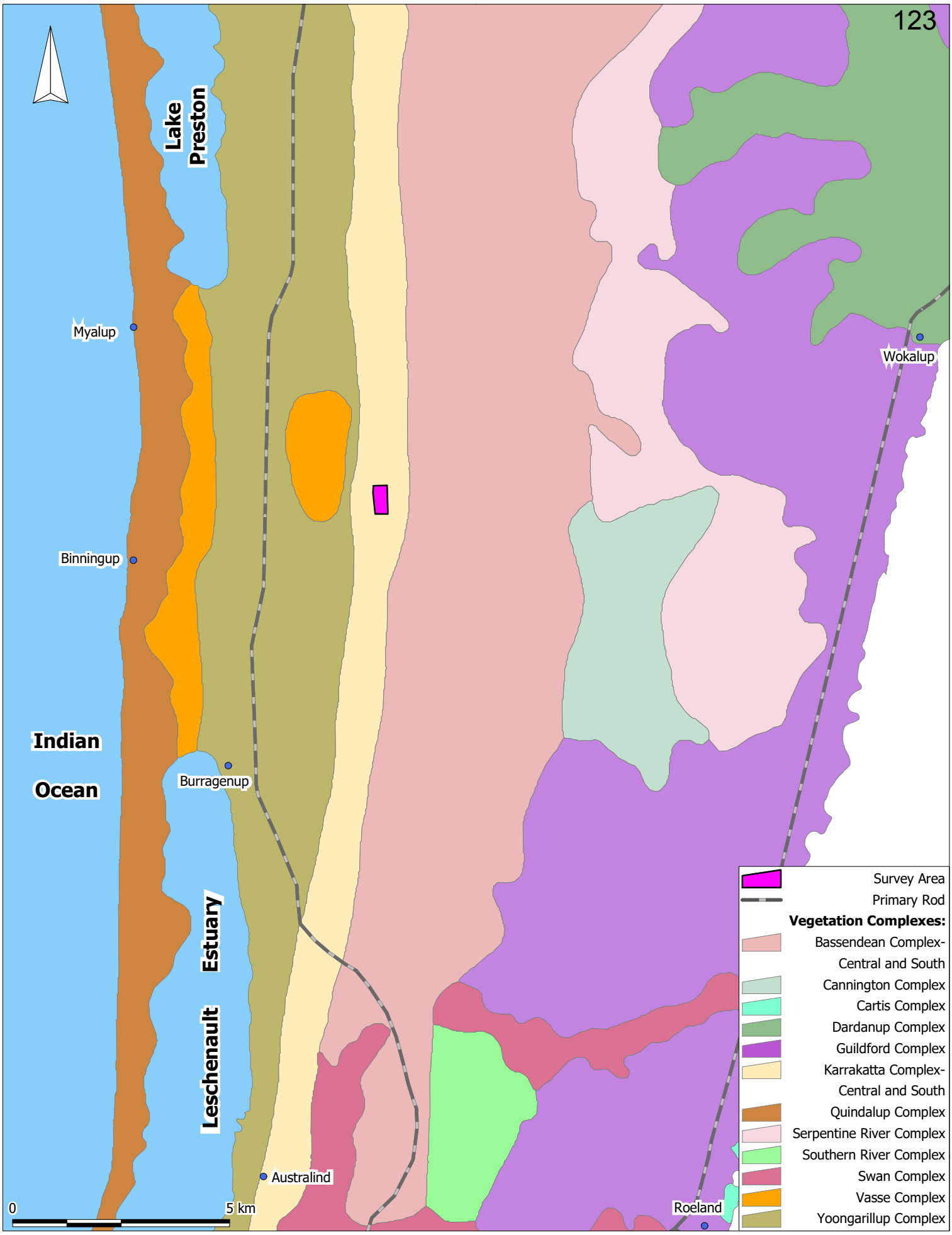
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Flora and Vegetation Assessment
Location: Lot 4 Runnymede Rd Wellesley

Figure 5:
Pre-European Vegetation



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Client: B & J Catalano
Project: Flora and Vegetation Assessment
Location: Lot 4 Runnymede Rd Wellesley

Figure 6:
Vegetation Complexes

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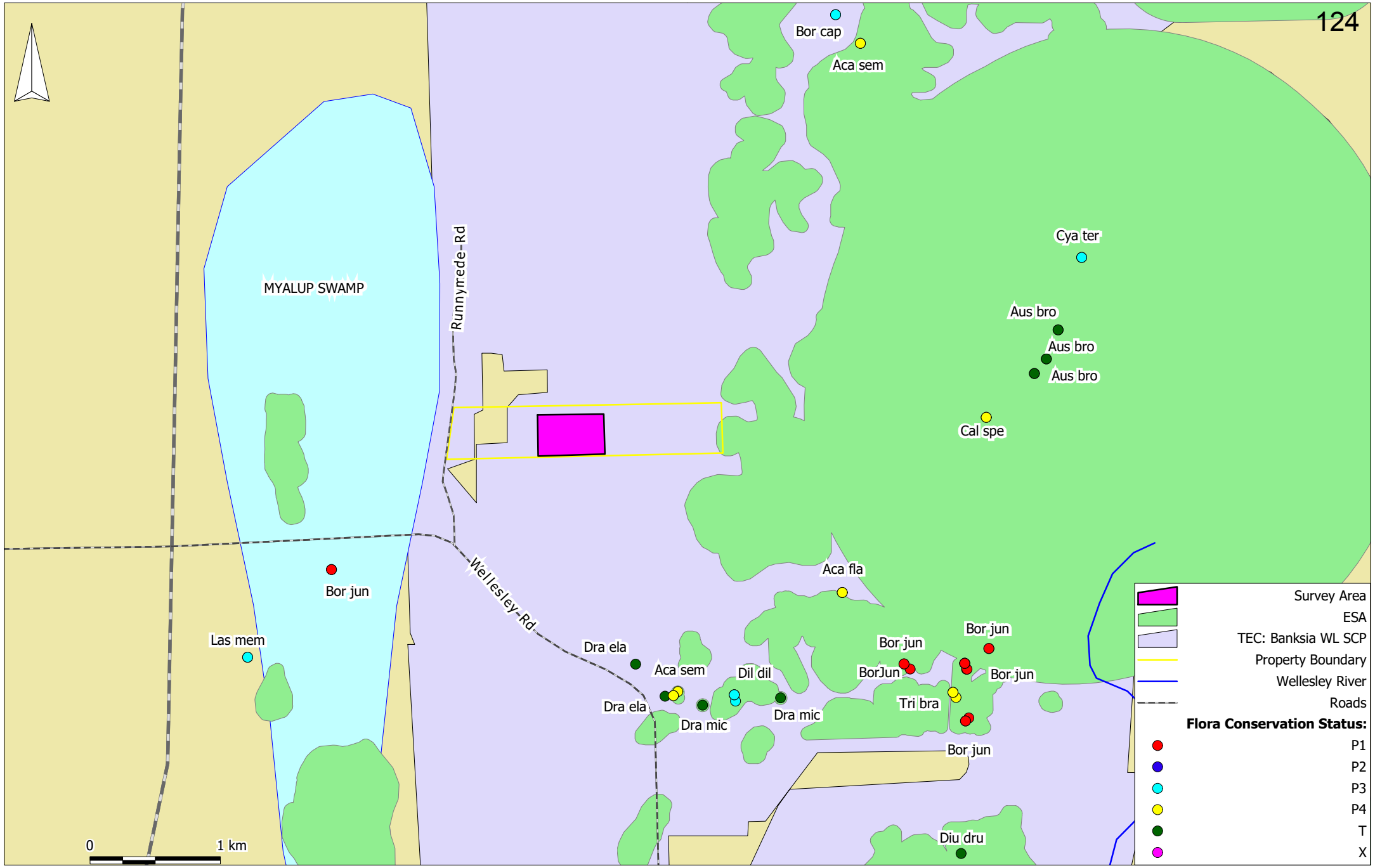

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Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Flora and Vegetation Assessment
Location: Lot 7 Runnymede Rd, Wellesley

Figure 7:
Environmental Values

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Lundstrom Environmental Consultants Pty Ltd

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Air Photo Source: Nearmap May 2017
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Flora and Vegetation Assessment
Location: Lot 7 Runnymede Rd, Wellesley

Figure 8:

Vegetation Type & Significant Flora

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Leeming WA 6149
Mob: 0417934863, mikelund1@bigpond.com

Scale: 1:2100
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Air Photo Source: Nearmap May 2017
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Flora and Vegetation Assessment
Location: Lot 7 Runnymede Rd, Wellesley

Figure 9:
Vegetation Condition

8 APPENDICES

Appendix 1. Sampling Site Description

Appendix 2. Declared Pest Plant Categories and Requirements

Appendix 3. Summary of Database Search Results

Appendix 4. Complete Species List (Family grouping)

Appendix 5. Matrix: Species x Quadrat

Appendix 6. Dendrogram outputs from FCT Analysis

APPENDIX 1.

QUADRAT DESCRIPTIONS

Plot 8	
Easting / Longitude	-33.1416338
Northing / Latitude	115.755286
Landform	midslope
Soil colour	Grey
Soil text	Clayey sand
Soil depth	>50 cm
Surface gravel	0
Bare ground %	10
Aspect	W
Fire Interval	>3 years
Slope	0-5
Impact	Low
Grazing	Low
Vegetation Condition	Excellent
Weed cover	0
Strata 1 Height	Trees
Strata 1 Cover	10-30%
Strata 1 Dominance	*Eucalyptus marginata, Agonis flexuosa, Banksia attenuata*
Strata 2 Height	Shrubs <1m
Strata 2 Cover	2-10%
Strata 2 Dominance	*Xanthorrhoea gracilis, Hibbertia hypericoides, Melaleuca thymoides*
Strata 3 Height	Herbs
Strata 3 Cover	10-30%
Strata 3 Dominance	*Lepidosperma squamatum*

Plot 9	
Easting / Longitude	-33.1415214
Northing / Latitude	115.7545775
Landform	Midslope
Soil colour	Grey
Soil text	Clayey sand
Soil depth	>50 cm
Surface gravel	0
Bare ground %	5
Aspect	W
Fire Interval	>3 years
Slope	0-5
Impact	Low
Grazing	Low
Vegetation Condition	Excellent
Weed cover	0
Strata 1 Height	Trees
Strata 1 Cover	10-30%
Strata 1 Dominance	*Eucalyptus marginata, Agonis flexuosa, Banksia attenuata*
Strata 2 Height	Shrubs <1m
Strata 2 Cover	2-10%
Strata 2 Dominance	*Xanthorrhoea gracilis, Hibbertia hypericoides, Melaleuca thymoides*
Strata 3 Height	Herbs
Strata 3 Cover	30-70%
Strata 3 Dominance	*Dasypogon bromeliifolius*

Plot 10	
Easting / Longitude	-33.1416705
Northing / Latitude	115.7521935
Landform	midslope
Soil colour	Grey
Soil text	Clayey sand
Soil depth	>50 cm
Surface gravel	0
Bare ground %	10
Aspect	W
Fire Interval	>3 years
Slope	0-5
Impact	Low
Grazing	Low
Vegetation Condition	Excellent
Weed cover	0
Strata 1 Height	Trees
Strata 1 Cover	10-30%
Strata 1 Dominance	*Eucalyptus marginata, Banksia attenuata, Corymbia calophylla*
Strata 2 Height	Shrubs <1m
Strata 2 Cover	10-30%
Strata 2 Dominance	*Xanthorrhoea gracilis, Hibbertia hypericoides, Melaleuca thymoides*
Strata 3 Height	Herbs
Strata 3 Cover	10-30%
Strata 3 Dominance	*Dasypogon bromeliifolius*

Plot 11	
Easting / Longitude	-33.1414014
Northing / Latitude	115.7511388
Landform	midslope
Soil colour	Grey
Soil text	Clayey sand
Soil depth	>50 cm
Surface gravel	0
Bare ground %	5
Aspect	W
Fire Interval	>3 years
Slope	0-5
Impact	Low
Grazing	Low
Vegetation Condition	Very good
Weed cover	0
Strata 1 Height	Trees
Strata 1 Cover	10-30%
Strata 1 Dominance	*Eucalyptus marginata, Banksia attenuata, Corymbia calophylla, Agonis flexuosa*
Strata 2 Height	Shrubs <1m
Strata 2 Cover	2-10%
Strata 2 Dominance	*Xanthorrhoea gracilis, Hibbertia hypericoides, Melaleuca thymoides*
Strata 3 Height	Herbs
Strata 3 Cover	2-10%
Strata 3 Dominance	*Dasypogon bromeliifolius*

Plot 109	
Easting / Longitude	383889
Northing / Latitude	6332504
Landform	Mid slope
Soil colour	Grey
Soil text	Clayey Sand
Soil depth	>50 cm
Surface gravel	0
Bare ground %	1
Aspect	N
Fire Interval	>3 years
Slope	5-15
Impact	Low
Grazing	Low
Vegetation Condition	Excellent
Weed cover	0
Strata 1 Height	Trees
Strata 1 Cover	30-70%
Strata 1 Dominance	*Eucalyptus marginata, Agonis flexuosa, Banksia attenuata*
Strata 2 Height	Shrubs <1m
Strata 2 Cover	2-10%
Strata 2 Dominance	*Hibbertia hypericoides, Melaleuca thymoides*
Strata 3 Height	Herbs
Strata 3 Cover	2-10%
Strata 3 Dominance	*Dasypogon bromeliifolius*

Plot 110	
Easting / Longitude	383740
Northing / Latitude	6332495
Landform	Mid slope
Soil colour	Grey
Soil text	Clayey Sand
Soil depth	>50 cm
Surface gravel	0
Bare ground %	4
Aspect	NW
Fire Interval	>3 years
Slope	5-15
Impact	Low
Grazing	Low
Vegetation Condition	Excellent
Weed cover	0
Strata 1 Height	Trees
Strata 1 Cover	30-70%
Strata 1 Dominance	*Eucalyptus marginata, Agonis flexuosa, Banksia attenuata, Corymbia calophylla*
Strata 2 Height	Shrubs <1m
Strata 2 Cover	<2%
Strata 2 Dominance	*Hibbertia hypericoides*
Strata 3 Height	Herbs
Strata 3 Cover	10-30%
Strata 3 Dominance	*Dasypogon bromeliifolius, Xanthorrhea gracillis*

Plot 111	
Easting / Longitude	383551
Northing / Latitude	6332442
Landform	Upper slope
Soil colour	Grey
Soil text	Clayey Sand
Soil depth	>50 cm
Surface gravel	0
Bare ground %	4
Aspect	W
Fire Interval	>3 years
Slope	5-15
Impact	Low
Grazing	Low
Vegetation Condition	Excellent
Weed cover	0
Strata 1 Height	Trees
Strata 1 Cover	30-70%
Strata 1 Dominance	*Eucalyptus marginata, Banksia attenuata, Corymbia calophylla*
Strata 2 Height	Shrubs <1m
Strata 2 Cover	2-10%
Strata 2 Dominance	*Melaleuca thymoides*
Strata 3 Height	Herbs
Strata 3 Cover	10-30%
Strata 3 Dominance	*Dasypogon bromeliifolius, Xanthorrhea gracillis*

Plot 112	
Easting / Longitude	383458
Northing / Latitude	6332420
Landform	Mid slope
Soil colour	Grey
Soil text	Clayey Sand
Soil depth	>50 cm
Surface gravel	0
Bare ground %	4
Aspect	W
Fire Interval	>3 years
Slope	5-15
Impact	Moderate
Grazing	Moderate
Vegetation Condition	Good
Weed cover	1
Strata 1 Height	Trees
Strata 1 Cover	30-70%
Strata 1 Dominance	*Eucalyptus marginata, Banksia attenuata, Corymbia calophylla*
Strata 2 Height	Shrubs <1m
Strata 2 Cover	<2%
Strata 2 Dominance	*Leucopogon propinquus*
Strata 3 Height	Herbs
Strata 3 Cover	10-30%
Strata 3 Dominance	*Dasypogon bromeliifolius*

APPENDIX 2.

SUMMARY OF PEST PLANT CATEGORIES AND REQUIREMENTS

Source: https://www.agric.wa.gov.au/declared-plants/declared-plant-requirements

Declared pest category

The Western Australian Organism List (WAOL) contains information on the area(s) in which a pest is declared and the control and keeping categories to which it has been assigned in Western Australia (WA). Use the external links on this page to reach WAOL.

Requirements for land owners/occupiers and other persons

Species	Common name	Records
Requirements for organisms in **Category 1** (C1, Exclusion) and **Category 2** (C2, Eradication)	Introduction of the plant or its seeds into, or movement within this area is prohibited.	Mark the location of the pest in such a way that it can be found again.
	Report the presence or suspected presence of this pest in this area (1800 084 881).	C1 and C2 category pests are of high importance to WA and must be reported as a priority. Please report sightings to the Pest and Disease Information Service (1800 084 881).
	Supply or advertising supply of this pest into this area is prohibited.	-
	If the declared pest is found in this area control measures must be taken to destroy, prevent or eradicate it.	Treat to destroy all plants, prevent seed set and prevent the spread of seed or plant parts within and from the area on or in livestock, fodder, grain, vehicles and/or machinery. Treat prior to seed set each year.
	Ensure that any person conducting an activity on the land is aware that measures are required to be taken to control the declared pest.	Erect a biosecurity sign for persons conducting an activity on the land.
Requirements for organisms in **Category 3** (C3, Management)	Introduction of the plant or its seeds into this area is prohibited.	—
	Supply or advertising supply of this pest into this area is prohibited.	—
	The infested area must be managed in such a way that alleviates the impact, reduces the number or distribution or prevents or contains the spread of the declared pest in this area.	Treat to destroy all plants, prevent seed set and prevent the spread of seed or plant parts within and from the area on or in livestock, fodder, grain, vehicles and/or machinery. Treat prior to seed set each year.
	Ensure that any person conducting an activity on the land is aware that measures are required to be taken to control the declared pest.	Erect a biosecurity sign for persons conducting an activity on the land.

APPENDIX 3.

DATABASE SEARCH RESULTS SUMMARY

Australian Government
Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

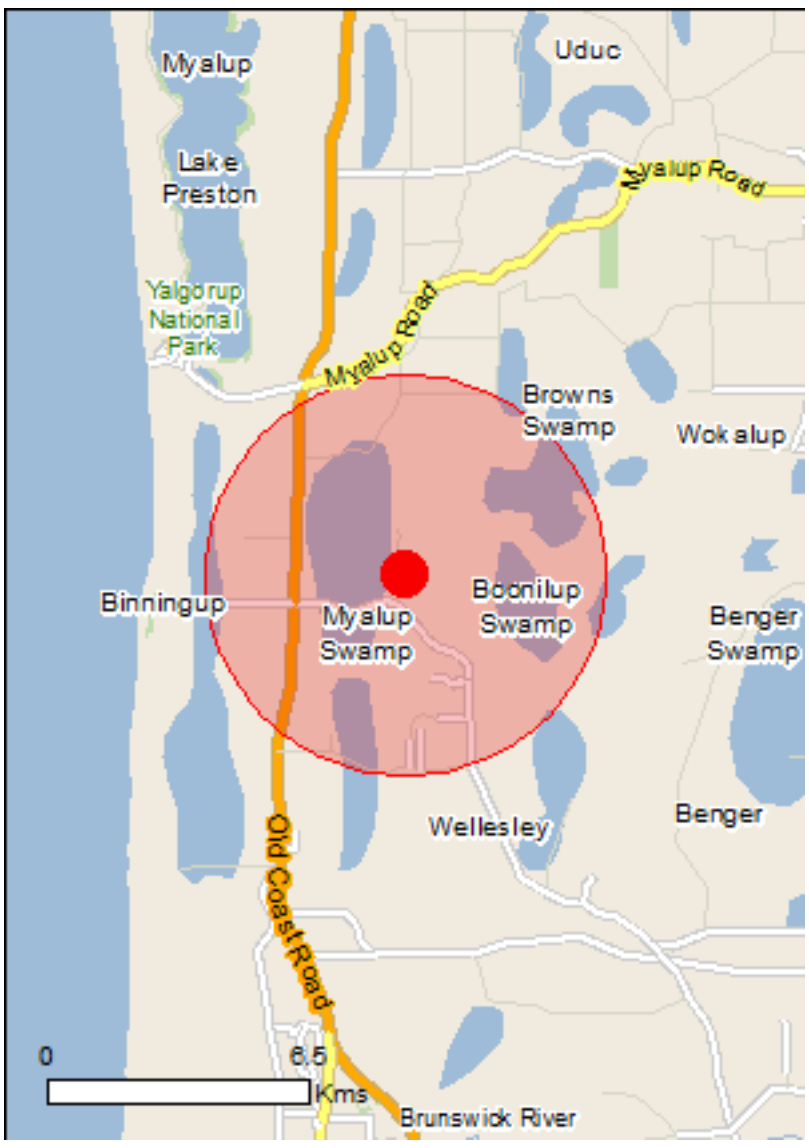
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 13/09/18 13:58:35

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



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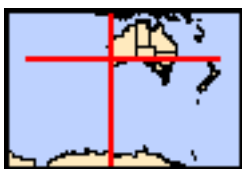

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	25
Listed Migratory Species:	12

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Regional Forest Agreements:	None
Invasive Species:	26
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Peel-yalgorup system	Within 10km of Ramsar

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Breeding likely to occur within area
Calyptorhynchus latirostris Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Rostratula australis		
Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Galaxiella nigrostriata		
Blackstriped Dwarf Galaxias, Black-stripe Minnow [88677]	Endangered	Species or species habitat known to occur within area
Mammals		
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area
Pseudocheirus occidentalis		
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat known to occur within area
Other		
Westralunio carteri		
Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat known to occur within area
Plants		
Andersonia gracilis		
Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Austrostipa bronwenae		
[87808]	Endangered	Species or species habitat known to occur within area
Caladenia huegelii		
King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area
Caladenia procera		
Carbunup King Spider Orchid [68679]	Critically Endangered	Species or species habitat known to occur within area
Diuris micrantha		
Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area
Diuris purdiei		
Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica		
Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area
Drakaea micrantha		
Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat known to occur within area
Synaphea sp. Fairbridge Farm (D. Papenfus 696)		
Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area
Synaphea sp. Serpentine (G.R. Brand 103)		
[86879]	Critically Endangered	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
[Ardenna carneipes](#) Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat likely to occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat likely to occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardea alba](#) Great Egret, White Egret [59541]		Breeding known to occur within area
[Ardea ibis](#) Cattle Egret [59542]		Species or species habitat may occur within

Name	Threatened	Type of Presence
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area
[Calidris canutus](#) Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
[Limosa lapponica](#) Bar-tailed Godwit [844]		Species or species habitat likely to occur within area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area
[Puffinus carneipes](#) Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
[Rostratula benghalensis (sensu lato)](#) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
[Thinornis rubricollis](#) Hooded Plover [59510]		Species or species habitat known to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
NTWA Bushland covenant (0004)	WA
NTWA Bushland covenant (0095)	WA

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.14257 115.74497

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

NatureMap Species Report

Created By Guest user on 23/08/2018

Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Circle'
Centre	115° 44' 54" E,33° 08' 43" S
Buffer	5km
Group By	Kingdom

Kingdom	Species	Records
Animalia	147	1044
Fungi	4	9
Plantae	150	219
TOTAL	**301**	**1272**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Animalia					
1.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
2.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
3.	24262	*Acanthiza inornata (Western Thornbill)*			
4.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
5.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
6.	42368	*Acritoscincus trilineatus (Western Three-lined Skink)*			
7.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
8.		*Aname tepperi*			
9.	24312	*Anas gracilis (Grey Teal)*			
10.	24315	*Anas rhynchotis (Australasian Shoveler)*			
11.	24316	*Anas superciliosa (Pacific Black Duck)*			
12.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
13.	24561	*Anthochaera carunculata (Red Wattlebird)*			
14.	25670	*Anthus australis (Australian Pipit)*			
15.	24285	*Aquila audax (Wedge-tailed Eagle)*			
16.	25558	*Ardea ibis (Cattle Egret)*			
17.	41324	*Ardea modesta (great egret, white egret)*			
18.	24340	*Ardea novaehollandiae (White-faced Heron)*			
19.	24341	*Ardea pacifica (White-necked Heron)*			
20.	24318	*Aythya australis (Hardhead)*			
21.		*Barnardius zonarius*			
22.	24319	*Biziura lobata (Musk Duck)*			
23.	25716	*Cacatua sanguinea (Little Corella)*			
24.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
25.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
26.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
27.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black Cockatoo)*		T	
28.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
29.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
30.	24086	*Cercartetus concinnus (Western Pygmy-possum, Mundarda)*			
31.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
32.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
33.	24980	*Christinus marmoratus (Marbled Gecko)*			
34.	25601	*Chrysococcyx lucidus (Shining Bronze Cuckoo)*			
35.	24288	*Circus approximans (Swamp Harrier)*			
36.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
37.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
38.	25592	*Corvus coronoides (Australian Raven)*			
39.	24671	*Coturnix pectoralis (Stubble Quail)*			
40.	25595	*Cracticus tibicen (Australian Magpie)*			
41.	25596	*Cracticus torquatus (Grey Butcherbird)*			
42.	25398	*Crinia georgiana (Quacking Frog)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
43.	25399	*Crinia glauerti (Clicking Frog)*			
44.	25400	*Crinia insignifera (Squelching Froglet)*			
45.	30893	*Cryptoblepharus buchananii*			
46.	25047	*Ctenotus impar*			
47.	25049	*Ctenotus labillardieri*			
48.	24322	*Cygnus atratus (Black Swan)*			
49.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
50.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
51.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
52.	24470	*Dromaius novaehollandiae (Emu)*			
53.	25100	*Egernia napoleonis*			
54.		*Egretta novaehollandiae*			
55.		*Elanus axillaris*			
56.		*Eolophus roseicapillus*			
57.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
58.	25623	*Falco longipennis (Australian Hobby)*			
59.	24189	*Falsistrellus mackenziei (Western False Pipistrelle, Western Falsistrelle)*		P4	
60.	24041	*Felis catus (Cat)*	Y		
61.	25727	*Fulica atra (Eurasian Coot)*			
62.	24761	*Fulica atra subsp. australis (Eurasian Coot)*			
63.	34027	*Galaxiella nigrostriata (Black-stripe Minnow, black-striped dwarf galaxias)*		T	
64.	25530	*Gerygone fusca (Western Gerygone)*			
65.	24443	*Grallina cyanoleuca (Magpie-lark)*			
66.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
67.	24295	*Haliastur sphenurus (Whistling Kite)*			
68.	24296	*Hamirostra isura (Square-tailed Kite)*			
69.	25410	*Heleioporus eyrei (Moaning Frog)*			
70.	25119	*Hemiergis quadrilineata*			
71.	47965	*Hieraaetus morphnoides (Little Eagle)*			
72.	25734	*Himantopus himantopus (Black-winged Stilt)*			
73.	24491	*Hirundo neoxena (Welcome Swallow)*			
74.	25133	*Lerista elegans*			
75.	25147	*Lerista lineata (Perth Slider, Lined Skink)*		P3	
76.	25005	*Lialis burtonis*			
77.	25661	*Lichmera indistincta (Brown Honeyeater)*			
78.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
79.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
80.	25388	*Litoria moorei (Motorbike Frog)*			
81.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
82.	25654	*Malurus splendens (Splendid Fairy-wren)*			
83.	25184	*Menetia greyii*			
84.	24598	*Merops ornatus (Rainbow Bee-eater)*			
85.		*Microcarbo melanoleucos*			
86.		*Missulena granulosa*			
87.	25191	*Morethia lineoocellata*			
88.	24223	*Mus musculus (House Mouse)*	Y		
89.	25248	*Neelaps bimaculatus (Black-naped Snake)*			
90.	24738	*Neophema elegans (Elegant Parrot)*			
91.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
92.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
93.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
94.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
95.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
96.	24693	*Pachyptila desolata (Antarctic Prion)*			
97.	25253	*Parasuta gouldii*			
98.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
99.	25682	*Pardalotus striatus (Striated Pardalote)*			
100.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
101.	48061	*Petrochelidon nigricans (Tree Martin)*			
102.	48066	*Petroica boodang (Scarlet Robin)*			
103.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
104.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
105.	25699	*Phalacrocorax varius (Pied Cormorant)*			
106.	24409	*Phaps chalcoptera (Common Bronzewing)*			
107.	48070	*Phascogale tapoatafa subsp. wambenger (South-western Brush-tailed Phascogale, Wambenger)*		S	
108.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
109.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
110.	25720	*Platycercus icterotis (Western Rosella)*			
111.	24747	*Platycercus spurius (Red-capped Parrot)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
112.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
113.	25703	*Podargus strigoides (Tawny Frogmouth)*			
114.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
115.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
116.	25722	*Polytelis anthopeplus (Regent Parrot)*			
117.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
118.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
119.	24166	*Pseudocheirus occidentalis (Western Ringtail Possum, ngwayir)*		T	
120.	25511	*Pseudonaja affinis (Dugite)*			
121.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
122.		*Purpureicephalus spurius*			
123.	24245	*Rattus rattus (Black Rat)*	Y		
124.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
125.	48096	*Rhipidura albiscapa (Grey Fantail)*			
126.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
127.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
128.	30948	*Smicrornis brevirostris (Weebill)*			
129.	25597	*Strepera versicolor (Grey Currawong)*			
130.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
131.	24259	*Sus scrofa (Pig)*	Y		
132.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
133.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
134.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
135.	48135	*Thinornis rubricollis (Hooded Plover, Hooded Dotterel)*		P4	
136.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
137.	25519	*Tiliqua rugosa*			
138.	25207	*Tiliqua rugosa subsp. rugosa*			
139.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
140.	24158	*Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)*			
141.	48147	*Turnix varius (Painted Button-quail)*			
142.	24386	*Vanellus tricolor (Banded Lapwing)*			
143.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
144.	25225	*Varanus rosenbergi (Heath Monitor)*			
145.	24206	*Vespadelus regulus (Southern Forest Bat)*			
146.	24040	*Vulpes vulpes (Red Fox)*	Y		
147.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			
Fungi					
148.	27691	*Cladonia ramulosa*			
149.	27748	*Flavoparmelia rutidota*			
150.		*Phytophthora cinnamomi*			
151.	28087	*Usnea inermis*			
Plantae					
152.	15466	*Acacia applanata*			
153.	3339	*Acacia flagelliformis*		P4	
154.	11611	*Acacia lasiocarpa var. lasiocarpa*			
155.	3482	*Acacia paradoxa (Kangaroo Thorn)*	Y		
156.	15481	*Acacia pulchella var. glaberrima*			
157.	15482	*Acacia pulchella var. goadbyi*			
158.	30036	*Acacia saligna subsp. stolonifera*			
159.	3537	*Acacia semitrullata*		P4	
160.	3557	*Acacia stenoptera (Narrow Winged Wattle)*			
161.	1790	*Adenanthos meisneri*			
162.	1791	*Adenanthos obovatus (Basket Flower)*			
163.	7820	*Ambrosia artemisiifolia (Annual Ragweed, Bitterweed, Hay-feverweed, Hog-weed)*	Y		
164.	3688	*Aotus gracillima*			
165.	7851	*Asteridea pulverulenta (Common Bristle Daisy)*			
166.	6323	*Astroloma ciliatum (Candle Cranberry)*			
167.	38480	*Austrostipa bronwenae*		T	
168.	17233	*Austrostipa campylachne*			
169.	1800	*Banksia attenuata (Slender Banksia, Piara)*			
170.	1822	*Banksia ilicifolia (Holly-leaved Banksia)*			
171.	3165	*Billardiera variifolia*			
172.	11612	*Boronia capitata subsp. gracilis*		P3	
173.	16633	*Boronia juncea subsp. juncea*		P1	
174.	4438	*Boronia ramosa*			
175.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
176.	244	*Briza maxima (Blowfly Grass)*	Y		
177.	12770	*Burchardia congesta*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
178.	1276	*Caesia micrantha (Pale Grass Lily)*			
179.	1592	*Caladenia flava (Cowslip Orchid)*			
180.	15348	*Caladenia flava subsp. flava*			
181.	18038	*Caladenia procera*		T	
182.	13862	*Caladenia speciosa*		P4	
183.	5460	*Calytrix fraseri (Pink Summer Calytrix)*			
184.	1162	*Cartonema philydroides*			
185.	13489	*Cerastium pumilum*	Y		
186.	1280	*Chamaescilla corymbosa (Blue Squill)*			
187.	10804	*Clematis linearifolia*			
188.	6348	*Conostephium pendulum (Pearl Flower)*			
189.	1418	*Conostylis aculeata (Prickly Conostylis)*			
190.	1436	*Conostylis juncea*			
191.	1438	*Conostylis laxiflora*			
192.	13354	*Craspedia variabilis*			
193.	16245	*Cyathochaeta teretifolia*		P3	
194.	7454	*Dampiera linearis (Common Dampiera)*			
195.	1218	*Dasypogon bromeliifolius (Pineapple Bush)*			
196.	3834	*Daviesia polyphylla*			
197.	3863	*Dillwynia dillwynioides*		P3	
198.	19649	*Disa bracteata*	Y		
199.	11049	*Diuris corymbosa*			
200.	10796	*Diuris drummondii (Tall Donkey Orchid)*		T	
201.	48253	*Diuris porphyrochila*			
202.	46858	*Diuris tinctoria*			Y
203.	1639	*Drakaea elastica (Glossy-leaved Hammer Orchid)*		T	
204.	13635	*Drakaea micrantha*		T	
205.	13209	*Drosera marchantii subsp. marchantii*			
206.	3112	*Drosera myriantha (Star Rainbow)*			
207.	3118	*Drosera pallida (Pale Rainbow)*			
208.	3131	*Drosera stolonifera (Leafy Sundew)*			
209.	11105	*Echinochloa crus-galli*	Y		
210.	332	*Echinochloa frumentacea (Siberian Millet)*	Y		
211.	1643	*Elythranthera brunonis (Purple Enamel Orchid)*			
212.	1644	*Elythranthera emarginata (Pink Enamel Orchid)*			
213.	5708	*Eucalyptus marginata (Jarrah, Djara)*			
214.	13547	*Eucalyptus marginata subsp. marginata (Jarrah)*			
215.	835	*Evandra pauciflora*			
216.	894	*Fimbristylis velata*			
217.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
218.	5135	*Hibbertia hypericoides (Yellow Buttercups)*			
219.	45534	*Hibbertia hypericoides subsp. hypericoides*			
220.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
221.	5176	*Hibbertia vaginata*			
222.	6222	*Homalosciadium homalocarpum*			
223.	3968	*Hovea trisperma (Common Hovea)*			
224.	12859	*Hovea trisperma var. trisperma*			
225.	12741	*Hyalosperma cotula*			
226.	5216	*Hybanthus calycinus (Wild Violet)*			
227.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
228.	1070	*Hypolaena exsulca*			
229.	16836	*Hypolaena viridis*			
230.	917	*Isolepis marginata (Coarse Club-rush)*			
231.	5832	*Kunzea ericifolia (Spearwood, Pondil)*			
232.	5038	*Lasiopetalum membranaceum*		P3	
233.	1309	*Laxmannia squarrosa*			
234.	925	*Lepidosperma angustatum*			
235.	1653	*Leporella fimbriata (Hare Orchid)*			
236.	46375	*Leptocarpus decipiens*			
237.	46382	*Leptocarpus roycei*			
238.	6445	*Leucopogon squarrosus*			
239.	6454	*Leucopogon verticillatus (Tassel Flower)*			
240.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
241.	1228	*Lomandra hermaphrodita*			
242.	1232	*Lomandra micrantha (Small-flower Mat-rush)*			
243.	1234	*Lomandra nigricans*			
244.	1243	*Lomandra sericea (Silky Mat Rush)*			
245.	1246	*Lomandra suaveolens*			
246.	1198	*Luzula meridionalis (Field Woodrush)*			
247.	1097	*Lyginia barbata*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
248.	5281	*Lythrum hyssopifolia (Lesser Loosestrife)*	Y		
249.	85	*Macrozamia riedlei (Zamia, Djiridji)*			
250.	18598	*Melaleuca systena*			
251.	5978	*Melaleuca teretifolia (Banbar)*			
252.	5980	*Melaleuca thymoides*			
253.	485	*Microlaena stipoides (Weeping Grass)*			
254.	15419	*Microtis media subsp. media*			
255.	8106	*Millotia tenuifolia (Soft Millotia)*			
256.	6201	*Myriophyllum verrucosum (Red Water Milfoil)*			
257.	8133	*Olearia elaeophila*			
258.	46316	*Orianthera serpyllifolia subsp. angustifolia*			
259.	1762	*Parietaria debilis (Pellitory)*			
260.	533	*Paspalum vaginatum (Salt Water Couch)*			
261.	1550	*Patersonia occidentalis (Purple Flag, Koma)*			
262.	4346	*Pelargonium littorale*			
263.	6006	*Pericalymma ellipticum (Swamp Teatree)*			
264.	2299	*Petrophile linearis (Pixie Mops)*			
265.	18529	*Philotheca spicata (Pepper and Salt)*			
266.	1478	*Phlebocarya ciliata*			
267.	6249	*Platysace compressa (Tapeworm Plant)*			
268.	4524	*Platytheca galioides*			
269.	8175	*Podolepis gracilis (Slender Podolepis)*			
270.	4691	*Poranthera microphylla (Small Poranthera)*			
271.		*Pterostylis aff. nana*			
272.	10875	*Pterostylis concava*			
273.	1693	*Pterostylis recurva (Jug Orchid)*			
274.	12217	*Pterostylis sanguinea*			
275.	1698	*Pterostylis vittata (Banded Greenhood)*			
276.	2440	*Rumex pulcher (Fiddle Dock)*	Y		
277.	40426	*Rytidosperma occidentale*			
278.	20063	*Salix babylonica*	Y		
279.	7595	*Scaevola anchusifolia*			
280.	7602	*Scaevola calliptera*			
281.	1020	*Schoenus sublateralis*			
282.	7037	*Solanum symonii*			
283.	1312	*Sowerbaea laxiflora (Purple Tassels)*			
284.	2316	*Stirlingia latifolia (Blueboy)*			
285.	7693	*Stylidium brunonianum (Pink Fountain Triggerplant)*			
286.	7798	*Stylidium schoenoides (Cow Kicks)*			
287.	7799	*Stylidium spathulatum (Creamy Triggerplant)*			
288.	48341	*Tetratheca hirsuta subsp. viminea*			
289.	10856	*Thelymitra benthamiana (Leopard Orchid)*			
290.	1338	*Thysanotus manglesianus (Fringed Lily)*			
291.	1343	*Thysanotus patersonii*			
292.	6280	*Trachymene pilosa (Native Parsnip)*			
293.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
294.	4292	*Trifolium campestre (Hop Clover)*	Y		
295.	44444	*Tripterococcus sp. Brachylobus (A.S. George 14234)*		P4	
296.	8255	*Ursinia anthemoides (Ursinia)*	Y		
297.	33537	*Vallisneria australis*	Y		
298.	6101	*Verticordia nitens (Morrison Featherflower, Kodjeningara)*			
299.	7389	*Wahlenbergia preissii*			
300.	8282	*Waitzia suaveolens (Fragrant Waitzia)*			
301.	6289	*Xanthosia huegelii*			

Conservation Codes
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

APPENDIX 4.

VASCULAR PLANT SPECIES RECORDED DURING FIELD SURVEY

(*represents weed species)

Family		Taxon	Conservation Status
Anarthriaceae		*Lyginia imberbis*	
Apiaceae		*Platysace filiformis*	
		Daucus glochidiatus	
Araliaceae		*Trachymene pilosa*	
Asparagaceae		*Lomandra caespitosa*	
		Lomandra hermaphrodita	
		Lomandra micrantha subsp. *micrantha*	
		Lomandra nigricans	
		Lomandra sericea	
		Lomandra suaveolens	
		Sowerbaea laxiflora	
		Thysanotus manglesianus	
Asphodelaceae	*	*Asphodelus fistulosus*	
Asteraceae	*	*Arctotheca calendula*	
	*	*Cotula turbinata*	
	*	*Hypochaeris glabra*	
		Lagenophora huegelii	
		Millotia tenuifolia ?var. *laevis*	P2
		Quinetia urvillei	
		Rhodanthe citrina	
	*	*Ursinia anthemoides*	
Caryophyllaceae	*	*Petrorhagia dubia*	
Colchicaceae		*Burchardia congesta*	
Cyperaceae		*Isolepis marginata*	
		Isotropis cuneifolia	
		Lepidosperma pubisquameum	
		Lepidosperma squamatum	
Dasypogonaceae		*Dasypogon bromeliifolius*	
Dilleniaceae		*Hibbertia hypericoides* subsp. *hypericoides*	
		Hibbertia racemosa	
Droseraceae		*Drosera ?macrantha*	
		Drosera bulbosa	

Family		Taxon	Conservation Status
		Drosera menziesii	
		Drosera stolonifera	
Elaeocarpaceae		*Tetratheca hirsuta* subsp. *viminea*	
Ericaceae		*Brachyloma preissii*	
		Leucopogon propinquus	
		Leucopogon racemulosus	
Fabaceae		*Acacia semitrullata*	P4
		Bossiaea eriocarpa	
		Gompholobium tomentosum	
		Jacksonia furcellata	
		Kennedia prostrata	
Haemodoraceae		*Conostylis aculeata* subsp. *preissii*	
		Conostylis juncea	
		Conostylis setigera	
		Caesia micrantha	
		Dianella revoluta var. *divaricata*	
		Tricoryne elatior	
Iridaceae		*Patersonia occidentalis*	
Lamiaceae		*Hemiandra pungens*	
Malvaceae		*Lasiopetalum ?membranaceum*	P3
Myrtaceae		*Agonis flexuosa*	
		Corymbia calophylla	
		Eucalyptus marginata	
		Kunzea glabrescens	
		Melaleuca thymoides	
Orchidaceae		*Caladenia arenicola*	
		Caladenia flava	
		Elythranthera brunonis	
		Pterostylis nana	
		Pterostylis sp.	
		Pyrorchis nigricans	
Phyllanthaceae		*Phyllanthus calycinus*	
Poaceae	*	*Briza maxima*	
	*	*Ehrharta longiflora*	
		Tetrarrhena laevis	
	*	*Vulpia bromoides*	

Family	Taxon	Conservation Status
Proteaceae	*Banksia attenuata*	
	Banksia grandis	
	Petrophile linearis	
Restionaceae	*Desmocladus fasciculatus*	
	Desmocladus flexuosus	
	Hypolaena exsulca	
Rubiaceae	*Opercularia hispidula*	
Rutaceae	*Philotheca spicata*	
Stylidiaceae	*Stylidium brunonianum*	
	Stylidium piliferum	
Xanthorrhoeaceae	*Chamaescilla corymbosa*	
	Xanthorrhoea gracilis	
Zamiaceae	*Macrozamia riedlei*	

APPENDIX 5.

MATRIX: SPECIES x QUADRAT

(+ represents presence)

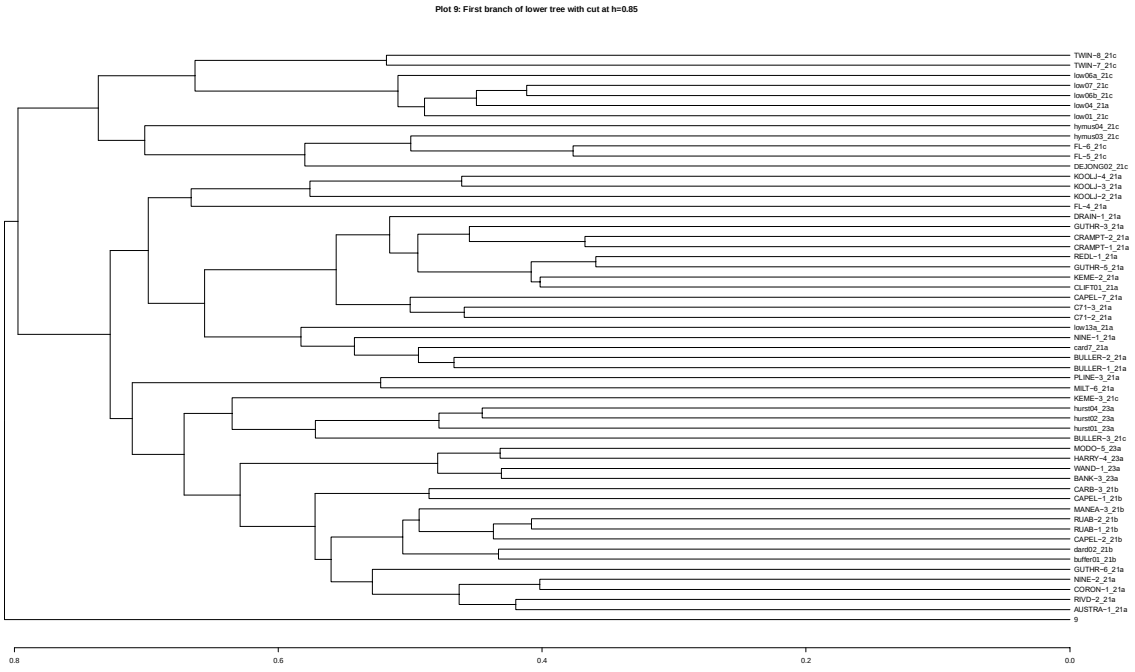
Name	Plot 8	Plot 9	Plot 10	Plot 11	Plot 109	Plot 110	Plot 111	Plot 112
Acacia semitrullata (P4)						+		
Agonis flexuosa	+	+		+	+	+		
Arctotheca calendula								+
Asphodelus fistulosus								+
Banksia attenuata	+	+	+	+	+	+	+	+
Banksia grandis			+			+		
Bossiaea eriocarpa	+	+	+		+	+		
Brachyloma preissii					+	+		
Briza maxima		+	+	+		+		
Burchardia congesta		+	+	+	+	+	+	
Caesia micrantha							+	
Caladenia flava	+	+	+	+	+	+	+	+
Chamaescilla corymbosa	+			+	+	+	+	+
+Conostylis aculeata subsp preissii	+	+			+		+	+
Conostylis juncea					+	+		
Conostylis setigera	+	+	+					
Corymbia calophylla			+	+		+	+	+
Cotula turbinata								+
+Dasypogon bromeliifolius		+	+	+	+	+	+	+
Daucus glochidiatus				+				
Desmocladus fasciculatus							+	
Desmocladus flexuosus				+	+	+	+	+
Dianella revoluta var divaricata			+		+			
Drosera ?macrantha						+	+	

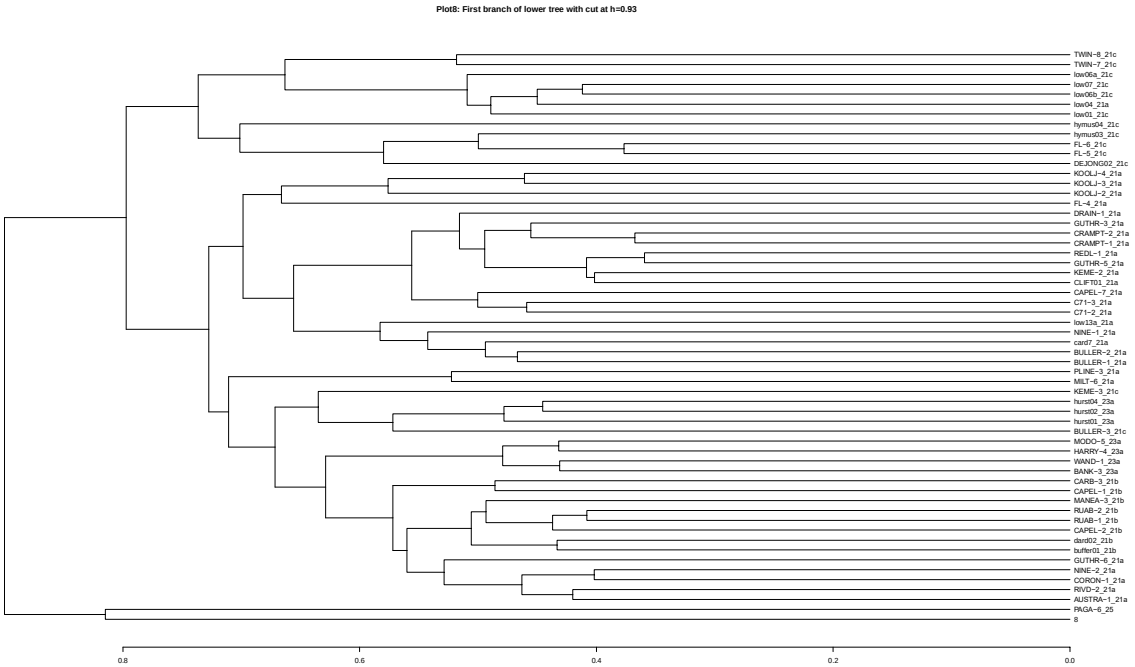
Name	Plot 8	Plot 9	Plot 10	Plot 11	Plot 109	Plot 110	Plot 111	Plot 112
Drosera bulbosa	+	+				+		
Drosera menziesii				+				
Drosera stolonifera	+	+	+	+	+	+	+	+
Ehrharta longiflora							+	+
Elythranthera brunonis		+	+	+				
Eucalyptus marginata	+	+	+	+	+	+	+	+
Gompholobium tomentosum					+	+		
Hemiandra pungens					+			
Hibbertia hypericoides subsp hypericoides	+	+	+	+	+	+	+	
Hibbertia racemosa	+				+	+	+	+
Hypochaeris glabra	+	+	+	+	+	+		+
Hypolaena exsulca	+		+		+		+	
Isolepis marginata				+				+
Isotropis cuneifolia	+	+			+		+	
Jacksonia furcellata			+					
Kennedia prostrata							+	
Kunzea glabrescens	+							
Lagenophora huegelii	+	+	+	+	+	+	+	
Lasiopatalum ?membranaceum (P3)					+			
Lepidosperma pubisquameum					+	+		
Lepidosperma squamatum	+		+					
Leucopogon propinquus							+	+
Leucopogon racemulosus				+		+	+	
Lomandra caespitosa								+
Lomandra hermaphrodita					+			
Lomandra micrantha subsp micrantha								+
Lomandra nigricans					+			
Lomandra sericea							+	+

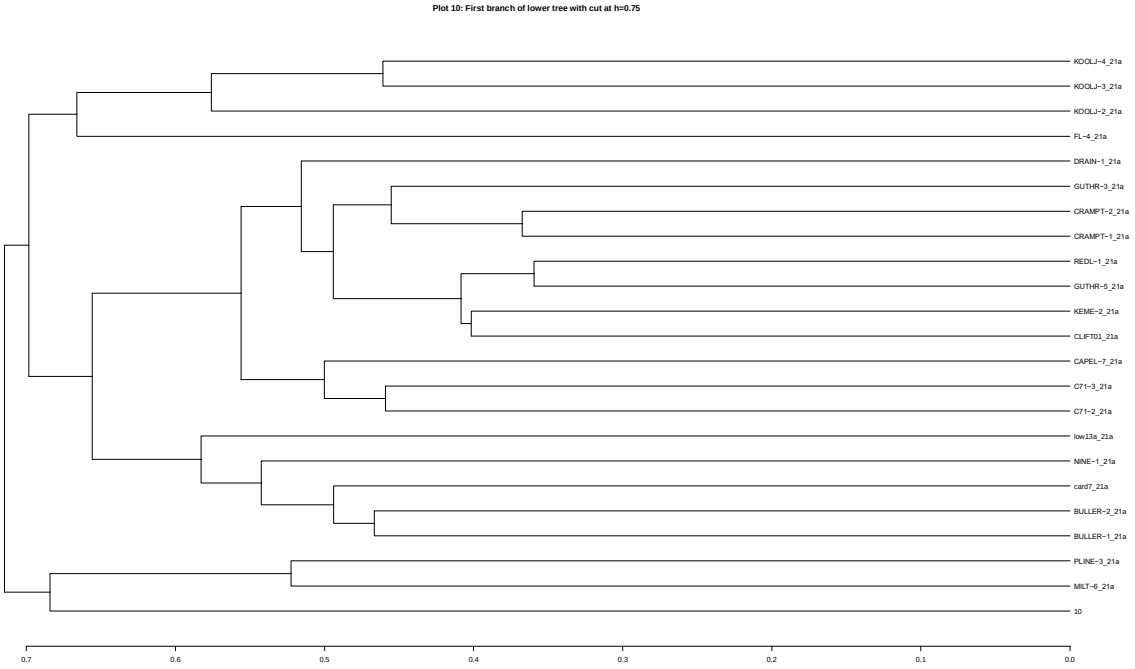
Name	Plot 8	Plot 9	Plot 10	Plot 11	Plot 109	Plot 110	Plot 111	Plot 112
Lomandra suaveolens	+		+		+	+		
Lyginia imberbis					+	+	+	+
Macrozamia riedlei			+				+	
Melaleuca thymoides	+	+	+	+	+	+	+	+
Millotia tenuifolia ?var laevis (P2)					+			
Opercularia hispidula	+	+	+		+	+	+	
Patersonia occidentalis				+	+			+
Petrophile linearis		+			+			
Petrorhagia dubia								+
Philotheca spicata	+	+	+	+	+	+	+	
Phyllanthus calycinus		+	+	+	+		+	
Platysace filiformis				+				
Pterostylis nana							+	+
Pterostylis sp						+		
Pyrorchis nigricans					+		+	
Quinetia urvillei					+	+		+
Rhodanthe sp					+	+		
Sowerbaea laxiflora	+	+	+	+			+	+
Stylidium brunonianum	+	+	+		+			
Stylidium piliferum	+				+			
Tetrarrhena laevis							+	
Tetratheca hirsuta subsp. viminea			+			+		
Thysanotus manglesianus				+	+	+		
Trachymene pilosa		+	+	+	+	+	+	+
Tricoryne elatior							+	+
Ursinia anthemoides					+	+	+	+
Vulpia bromoides						+		
Xanthorrhoea gracilis	+	+	+	+	+	+	+	

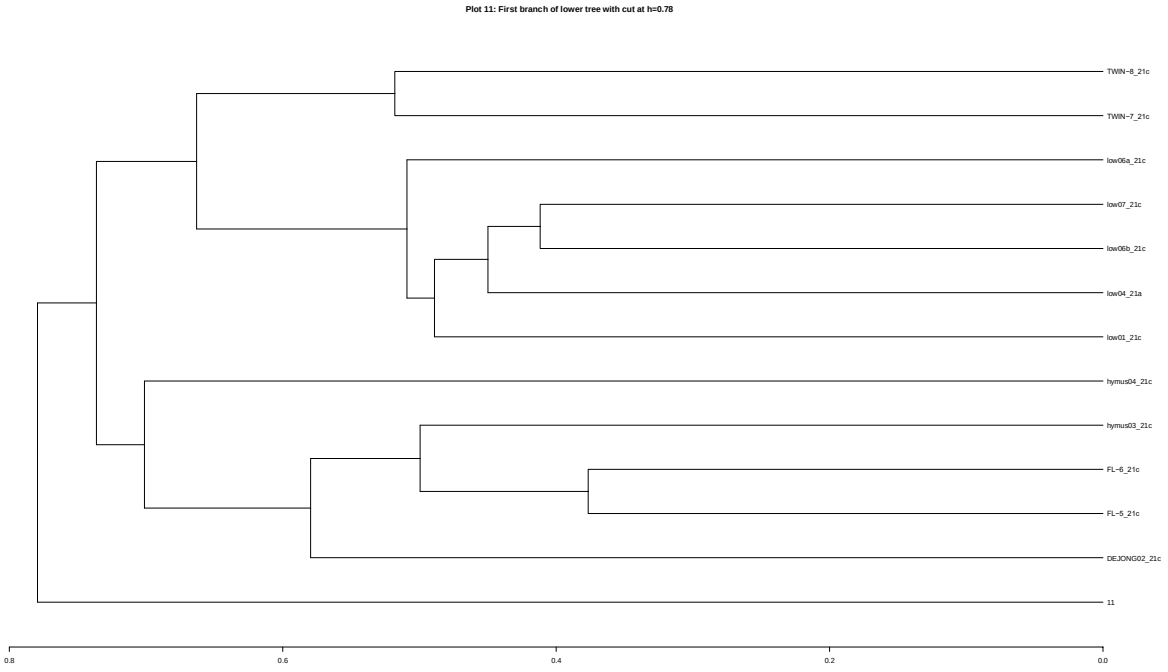
APPENDIX 6.

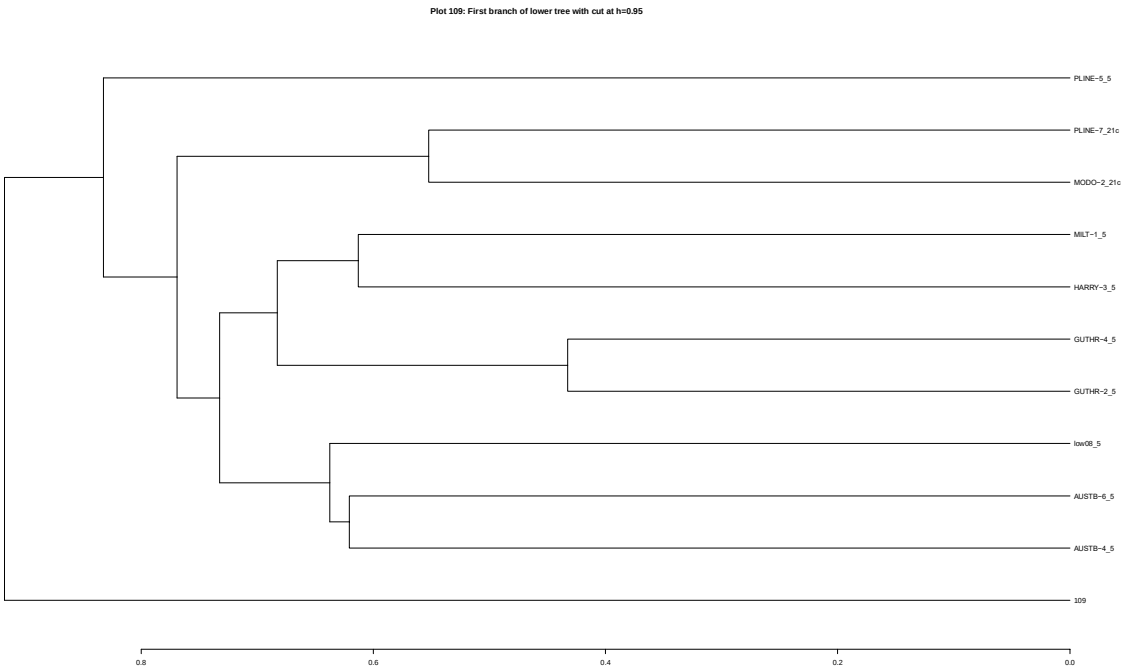
DENDROGRAM OUTPUT FROM FCT ANALYSIS

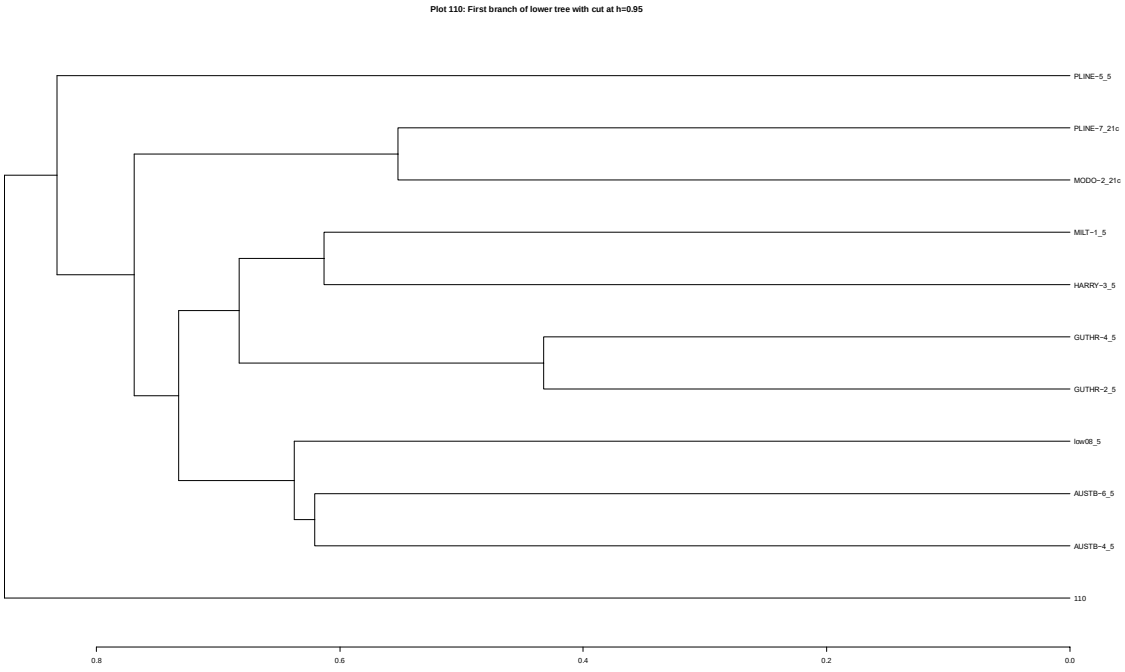





Plot 10: First branch of lower tree with cut at h=0.75
KOOLJ~4_21a
KOOLJ~3_21a
KOOLJ~2_21a
FL~4_21a
DRAIN~1_21a
GUTHR~3_21a
CRAMPT~2_21a
CRAMPT~1_21a
REDL~1_21a
GUTHR~5_21a
KEME~2_21a
CLIFT01_21a
CAPEL~7_21a
C71~3_21a
C71~2_21a
low13a_21a
NINE~1_21a
card7_21a
BULLER~2_21a
BULLER~1_21a
PLINE~3_21a
MILT~6_21a
10
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0


Plot 11: First branch of lower tree with cut at h=0.78
TWIN~8_21c
TWIN~7_21c
low06a_21c
low07_21c
low06b_21c
low04_21a
low01_21c
hymus04_21c
hymus03_21c
FL~6_21c
FL~5_21c
DEJONG02_21c
11
0.8
0.6
0.4
0.2
0.0


Plot 109: First branch of lower tree with cut at h=0.95
PLINE~5_5
PLINE~7_21c
MODO~2_21c
MILT~1_5
HARRY~3_5
GUTHR~4_5
GUTHR~2_5
low08_5
AUSTB~6_5
AUSTB~4_5
109
0.8
0.6
0.4
0.2
0.0


Plot 110: First branch of lower tree with cut at h=0.95
PLINE~5_5
PLINE~7_21c
MODO~2_21c
MILT~1_5
HARRY~3_5
GUTHR~4_5
GUTHR~2_5
low08_5
AUSTB~6_5
AUSTB~4_5
110
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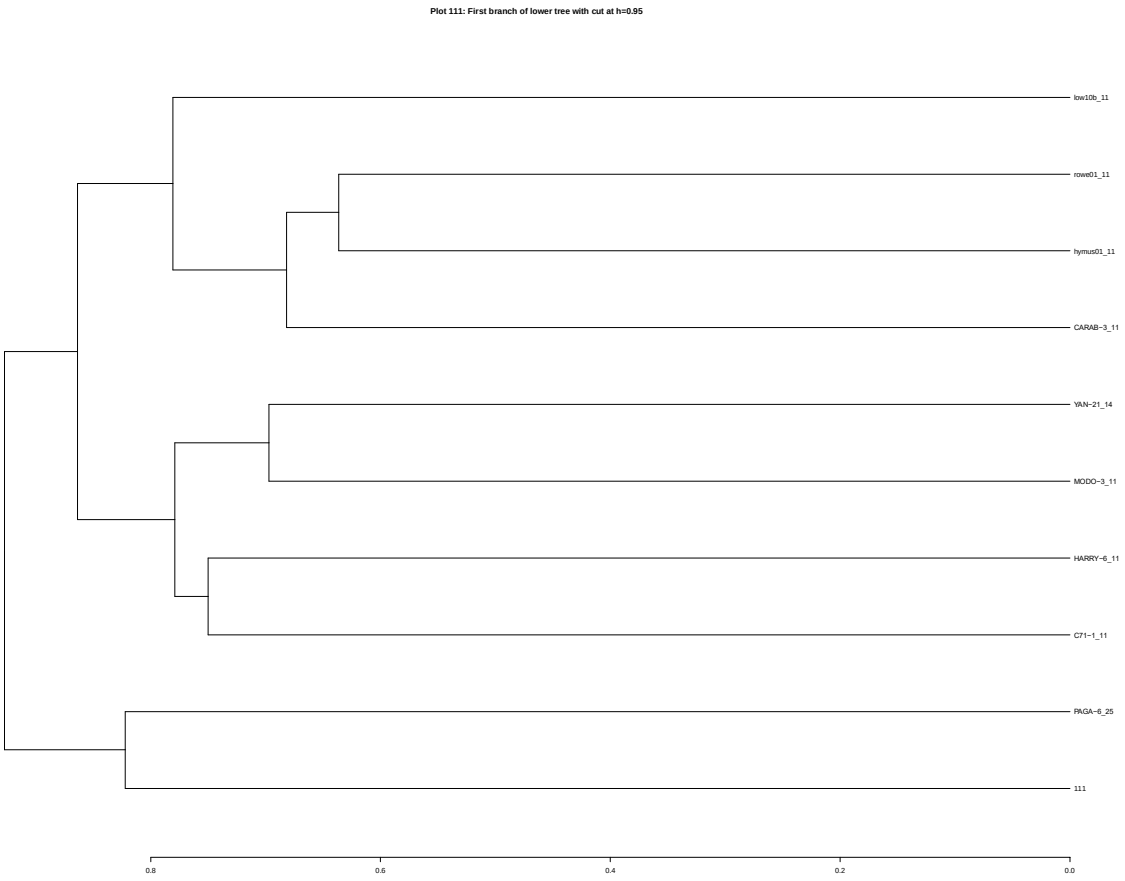
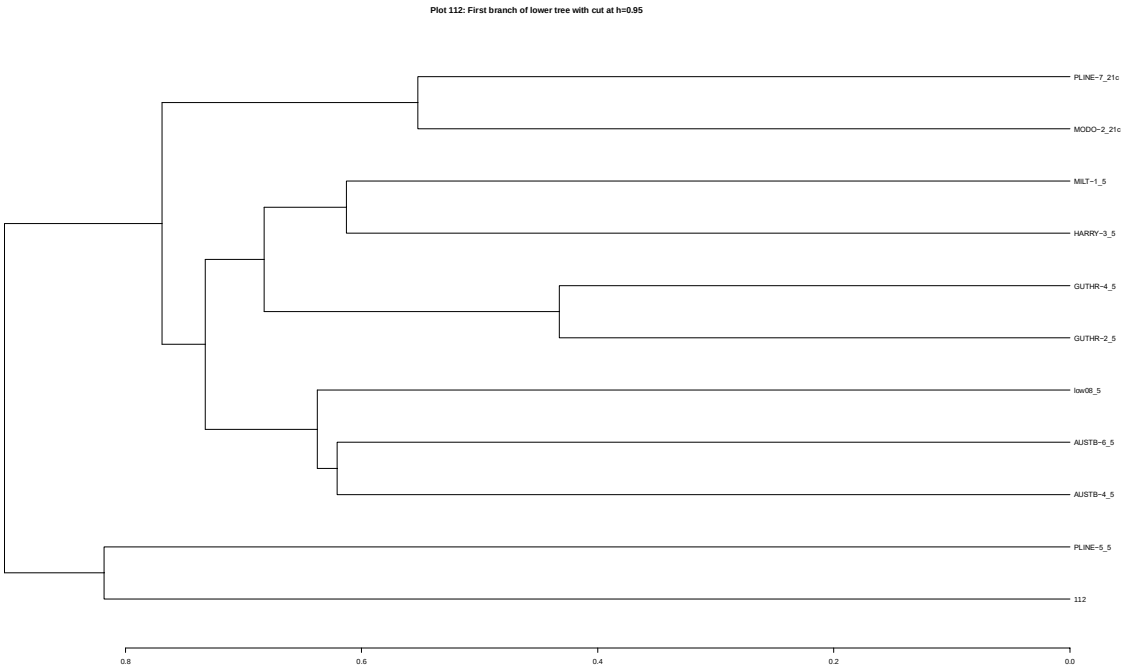

Plot 111: First branch of lower tree with cut at h=0.95
low10b_11
rowe01_11
hymus01_11
CARAB~3_11
YALN~21_14
MODO~3_11
HARRY~6_11
C71~1_11
PAGA~6_25
111
0.8
0.6
0.4
0.2
0.0


Plot 112: First branch of lower tree with cut at h=0.95
PLINE~7_21c
MODO~2_21c
MILT~1_5
HARRY~3_5
GUTHR~4_5
GUTHR~2_5
low08_5
AUSTB~6_5
AUSTB~4_5
PLINE~5_5
112
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Proposal

The proposal involves the extraction of sand from an area of 1.17ha currently occupied by high quality bushland that supports fauna habitats and flora species and can be summarised as follows:

- The subject area contains banksia dominated woodlands of the Swan Coastal Plain which listed as a Priority 3 (P3) ecological community under the *Environmental Protection Act 1986* (EP Act). P3 requires survey and/or definition of the community, and evaluation of its conservation status. The Banksia Woodlands are also a threatened ecological community (TEC), listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It is to be noted that the Banksia Woodlands ecological community has undergone a decline of about 60 per cent in its extent (Banksia Woodlands of the Swan Coastal Plain: a nationally protected ecological community (*Department of the Environment and Energy, Federal Government,2016).*

- The EIL area is within a 'Possible' breeding area buffer, possible feeding habitat and a 'Confirmed' roosting area buffer for the threatened Carnaby's black cockatoo (Calyptorhynchus latorostris).

- The proposed extraction area lies within the Drummond Botanical Sub-district of the Darling Botanical District, which falls within the Southwest Botanical Province and is recognised as having a very high degree of species diversity being characterised by Banksia woodland on leached sands with Melaleuca swamps; woodlands of tuart (*Eucalyptus gomphocephala*), jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*).

- The vegetation complex of the Survey Area is part of the “Karrakatta Complex – Central and South”, which is described as ‘predominantly open forest of Eucalyptus gomphocephala – E. marginata- E. calophylla and woodland of E. marginata – Banksia spp.’ (Webb et. al 2016).

- The entire Survey Area has been mapped as a community that is likely to contain Banksia Woodlands of the Swan Coastal Plain ecological community, an Endangered TEC listed as under the EPBC Act. A summary of the database search results, including the likely presence of TECs, is presented in Appendix 3 of the report. Field assessments were used to confirm the presence of the TEC within the Study area.

- The majority of the vegetation within the 1.17ha site is notated as being in ‘good’ condition and some is in ‘very good’ condition and some is in ‘excellent’ condition (See attached overlay on aerial). This meets the criteria for inclusion within the EPBC Act listed Banksia Woodlands TEC.

- Three Priority flora, as listed by DBCA (2018a) were recorded in the Survey Area that includes the subject site. The recorded Priority species included one P4 species (Acacia semitrullata), one P2 species (Millotia tenuifolia var. *laevis*); one P3 species (*Lasiopetalum membranaceum*)).

- The survey indicates that Chuditch are known to occur within the area.

- The EIL area also contains potential for habitat for the threatened western ringtail possum (Pseudocheirus occidentalis) (Landgate 2021).

- With respect to fauna habitat values, the majority of the vegetation is mostly in good condition and would therefore have the capacity to support a wide range of the predicted fauna species.

- Almost all the remnant vegetation present within the surveyed area (~18.9 ha) can be regarded as quality foraging habitat for black cockatoos given the presence of jarrah, marri and/or banksia in all areas.

Matters to be Considered by the Local Government

Clause 67 of the Deemed Provisions provides matters that Council is required to give due regard to when considering an application. The following "Matters to be Considered" are relevant to this application and are discussed below:

- *The aims and provisions of this Scheme and any other - Clause 67 (2)(a)*

  Objective (g) in clause 1.6.1 states as follows:

  > *"to protect and preserve the more important natural flora and fauna habitats (ecosystem, biodiversity, and essential ecological processes), and other environmentally sensitive areas that are prone to degradation on the principle that the extent and manner of use of these areas should be kept within their capabilities of being sustained without degradation in the long term."*

  This proposal is directly in conflict with this objective as it involves the removal of 1.17ha of 'good, very good and excellent' quality native vegetation.

  Supporting the clearing of native vegetation that:

  - Is regionally and nationally significant;
  - Is nationally protected; and
  - Provides habitat for nationally protected fauna

  is contrary to this objective.

- *Approved State Planning Policies – Clause 67(2)(c)*

  A relevant objective of State Planning Policy 2: Environment and Natural Resources (SPP 2) is *"to protect, conserve and enhance the natural environment"*. The Policy also provides that:

  - *"The implementation of planning decisions can have an impact on the environment …" "… decision-making should:*
    - *Avoid development that may result in unacceptable environmental damage.*
    - *Protect significant natural … features, including sites and features significant as habitats and for their floral … built … visual or wilderness values.*
    - *Support conservation, protection, and management of native remnan vegetation where possible, to enhance soil and land quality, water quality, biodiversity, fauna habitat, landscape, amenity values and ecosystem function.*
    - *Seek to avoid or minimise any adverse impacts, directly or indirectly, on areas of high biodiversity or conservation value as a result of changes in land use or development.*
    - *Identify and safeguard landscapes with high … ecological values, as well as those of aesthetic, cultural or historical value to the community, and encourage the restoration of those that are degraded.*

- *"Biodiversity is also fundamental to the quality and character of the landscape and in providing … aesthetic value and cultural identity. Planning should recognise the State's biodiversity in considering changes of land use"*

In addition to SPP 2, State Planning Policy 2.4: Basic Raw Materials (SPP 2.4) provides the following:

- *avoid and/or minimise the potential negative impacts on amenity and the environment arising from an extractive industry, when identifying areas for future growth.*

Another State Planning Policy 2.5: Rural Planning (SPP 2.5) has an objective to *"protect and sustainably manage environmental, landscape … assets."* The provisions of this Policy provide the following:

- *seek to protect rural land as a State resource by:*
  - *ensuring retention and protection of rural land for biodiversity protection, natural resource management and protection of valued landscapes and views.*
- *Environmental and landscape attributes will be managed and improved by:*
  - *supporting the inclusion into strategies and schemes of provisions that promote protection of valued landscape and views, as required.*

The Rural Planning Guidelines linked to SPP 2.5 provides that, when assessing proposals, consideration should be given to *"clearing of vegetation."*

Supporting the clearing of the subject vegetation would therefore be inconsistent with the above identified objectives and principles of these SPP's and Guidelines.

- *Endorsed Local Planning Strategy – Clause 67(2) (fa)*

  A relevant objective of the Shire's endorsed Local Planning Strategy is *"Protecting the significant areas of remnant vegetation, conservation category wetlands and local/regional ecological linkages."*

- *Likely effect on natural environment – Clause 67(2)(o)*

  The site comprises many trees, with canopies spaced close to one another. As stated in the Applicant's report *"The area is largely comprised of a jarrah and marri open woodland over a banksia low woodland." "Ground cover and low shrubs vary in density from area to area being very sparse at some locations and dense in others. Hollow bearing trees makeup about 25% of the trees present based on the habitat tree survey."*

  The vegetation includes a few flora species and provides habitat for several fauna species. As such, the removal of the existing vegetation on the site will have a significant effect on the natural environment

- *Provision for landscaping and preservation of vegetation – Clause 67(2)(p)*

  The proposal as stated in the Pit rehabilitation and Maintenance Management Plan is to rehabilitate this section back to pasture. The existing vegetation on the site should be preserved as it contains a high quality of trees that justify protection. The majority of the vegetation in the 1.17ha site is in 'good' condition and with some being in 'very good' and 'excellent' condition, which meets the criteria for inclusion within the EPBC Act listed Banksia Woodlands TEC and is characterised by high quality Banksia woodland on leached sands

with Melaleuca swamps; woodlands of tuart (*Eucalyptus gomphocephala*), jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*).

- *Suitability of land – Clause 67(2)q)*

  The removal of the trees, as identified in SPP 2, *"can have a profound effect on land quality by removing its protective cover and creating the potential for erosion, salinity and loss of soil and water quality."* This being the case, the proposed vegetation clearing has the potential to create irreversible damage on the land quality.

Reasons for Refusal

The proposal is contrary to the following provisions of Clause 67(2) of the Planning and Development (Local Planning Schemes) Regulations 2015:

a. Does not protect and preserve the more important natural flora and fauna habitats and is therefore, contrary to Clause 67(2)(a) and Clause 1.6.1(g) of the Shire of Harvey District Planning Scheme No. 1;

b. Does not:

   i. protect, conserve, and enhance the natural environment;

   ii. ensure the retention and protection of rural land for biodiversity protection;

   iii. protect valued landscapes;

   iv. effectively manage environmental impacts;

   v. manage and improve environmental and landscape attributes;

   and is therefore contrary to Clause 67(2)(c) and the objectives and principles of State Planning Policies 2.0, 2.4 and 2.5;

c. Does not protect significant areas of remnant vegetation or balance the environmental and visual objectives and is therefore contrary to Clauses 67(2) (fa) and the Shire of Harvey's endorsed Local Planning Strategy;

d. Will have a significant effect on the natural environment and is therefore contrary to Clause 67(2)(o);

e. Does not make provision for the preservation of vegetation and is therefore contrary to Clause 67(2)(p); and

f. Has the potential to create irreversible damage to the land quality by creating the potential for erosion and loss of soil and is therefore contrary to Clause 67(2)(q).

From: Brooke Josland **On Behalf Of** shire e-mail
Sent: Tuesday, 9 November 2021 11:23 AM
To: Neville Dowling <nevilled@harvey.wa.gov.au>
Cc: Nicole Shore <nicoles@harvey.wa.gov.au>
Subject: FW: Proposed sand extraction at Lot 7 Runnymede Road, Wellesley (DWER ref: PA 045386 , DWERVT5615~2 ; Shire ref: A002575/EX/004) 21/23878

This has been saved to Recfind – See 21/23878

Brooke

From: Daniel Wong <daniel.wong@dwer.wa.gov.au>
Sent: Tuesday, 9 November 2021 10:40 AM
To: shire e-mail <shire@harvey.wa.gov.au>
Subject: Proposed sand extraction at Lot 7 Runnymede Road, Wellesley (DWER ref: PA 045386 , DWERVT5615~2 ; Shire ref: A002575/EX/004) 21/23878

9th November 2021

Our Reference: PA 045386 , DWERVT5615~2

Your reference: A002575/EX/004

To: Shire of Harvey

From: Department of Water and Environmental Regulation

Attention: Neville Dowling

RE: Proposed sand extraction at Lot 7 Runnymede Road, Wellesley

Dear Neville,

Thank you for providing the above proposal for the Department of Water and Environmental Regulation (Department) to consider.

The Department has identified that the proposal has the potential for impact on the environment and water resource management. Key issues and recommendations are provided below and these matters should be addressed:

- **Issue 1**: The proposed operations are categorised as a Prescribed Premises under the *Environmental Protection Regulations* 1987
- **Advice 1**: The Shire be advised that:
    - a) the Department has received and is currently assessing the Works Approval application for this proposal
    - b) the works approval or licence issued under Part V of the EP Act will only regulate emissions associated with the category 12 crushing and screening

activities (such as dust, noise and contaminated stormwater). It however does not extend to the environmental impacts of extracting the material from the ground or transport off-site

- **Issue 2**: Clearing of native vegetation is subject to the *Environmental Protection Act 1986* (EP Act)
- **Advice 2**: The proponent is to apply for a clearing permit under the EP Act at https://www.der.wa.gov.au/our-work/clearing-permits/46-clearing-permit-application-forms

- **Issue 3**: Water supply
- **Advice 3**: The Shire to:
    - a) impose a condition that the proponent is to quantify their water requirements for all aspects of the proposed extraction and provide evidence of a secure water source, to the satisfaction of the Shire
    - b) note that the Department is currently working with the proponent (B&J Catalano) to finalise their licence amendment to include water use on Lot 7 under their current groundwater license (GWL165046)
    - c) note that the amended groundwater licence will likely include updated monitoring requirements to manage potential risks to the water resource and other users, including the environment

- **Issue 4**: Environmental risks
- **Advice 4**: The proposed extraction is to be implemented in accordance with DWER's Water quality protection note (WQPN) no. 15 '*Basic raw materials extraction*' where appropriate to the site situation to ensure environmental risks are appropriately mitigated

- **Issue 5**: Rehabilitation Plan and final landform
- **Advice 5**: The shire to:
    - a) Condition that the Rehabilitation Plan be implemented to the satisfaction of the Shire consistent with WQPN 15 and the Guidelines for Preparing Mine Closure Plans[1]. The proponent is to adhere to the intended staging and ensure successful rehabilitation to the final landform and landuse
    - b) Request the proponent update the 'Final Land Surface and Rehabilitation' plan to include the final landform for the new EIL area

Where the Department has a statutory role, planning applications should be considered prior to the Department issuing any relevant permits, licenses and/or approvals.

In the event that the applicant determines that a works approval or licence application is required under Part V of the *Environmental Protection Act 1986* (EP Act), the advice provided in this

communication does not prejudice and must not be considered to infer the outcome of the EP Act licence and works approval process.

More detail pertaining to the above issues are provided in Table 1 below.

In the event there are modifications to the proposal that may have implications on aspects of environment and/or water management, the Department should be notified to enable the implications to be assessed.

Should you require any further information on the comments please contact the undersigned.

Thank you.

Yours sincerely,

Daniel Wong
Environmental Officer
Department of Water and Environmental Regulation
Planning Advice South West Region

Email: daniel.wong@dwer.wa.gov.au
Phone: 08 9726 4113
Fax: 08 9726 4100
Postal: PO Box 261, Bunbury, WA 6231
Location: 35-39 McCombe Road, Bunbury, WA 6230

Table 1 - Department of Water and Environmental Regulation detailed comments on A002575/EX/004

Item No.	Ref	Reviewer comment/advice
1	N/A	**Issue 1:** The proposed operations are categorised as a Prescribed Premises under the *Environmental Protection Regulations* 1987 **Advice 1:** The Shire be advised that: • a) the Department has received and is currently assessing the Works Approval application for this proposal • b) the works approval or licence issued under Part V of the EP Act will only regulate emissions associated with the category 12 crushing and screening activities (such as dust, noise and contaminated stormwater). It however does not extend to the environmental impacts of extracting the material from the ground or transport off-site **Discussion 1:** The Department of Water and Environmental Regulation (DWER) regulates emissions and discharges from the construction and operation of prescribed premises through a works approval and licensing process, under Part V, Division 3 of the *Environmental Protection Act 1986* (EP Act).

The categories of prescribed premises are outlined in Schedule 1 of the *Environmental Protection Regulations 1987*.

The EP Act requires a works approval to be obtained before constructing a prescribed premises and makes it an offence to cause an emission or discharge from an existing prescribed premises unless they are the holder of a works approval or licence (or registration) and the emission is in accordance with any conditions to which the licence or works approval is subject.

The provided development application request was reviewed in relation to works approval and licence requirements under Part V Division 3 of the EP Act.

Based on the information provided, DWER can advise that the information is consistent with a works approval application submitted to DWER in respect to the following category as per Schedule 1 of the *Environmental Protection Regulations 1987*:

Category	**Category description**	**Production or design capacity**
12	Screening, etc. of material: premises (other than premises within category 5 or 8) on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated.	50,000 tonnes or more per year

The *Environmental Protection Act 1986* makes it an offence to undertake any work which causes a premises to become, or become capable of being, a Prescribed Premises unless the work is undertaken in accordance with a works approval. It is also an offence under the EP Act to alter the nature and/or volume of any emissions, unless done so in accordance with a works approval or licence or a registration (for operation) is held for the premises.

The Department has received and is currently assessing the Works Approval application for this proposed wet screening plant.

The application will also need to demonstrate compliance with the general provisions of the EP Act, *Environmental Protection (Noise) Regulations 1997* and *Environmental Protection (Unauthorised Discharges) Regulations 2004.*

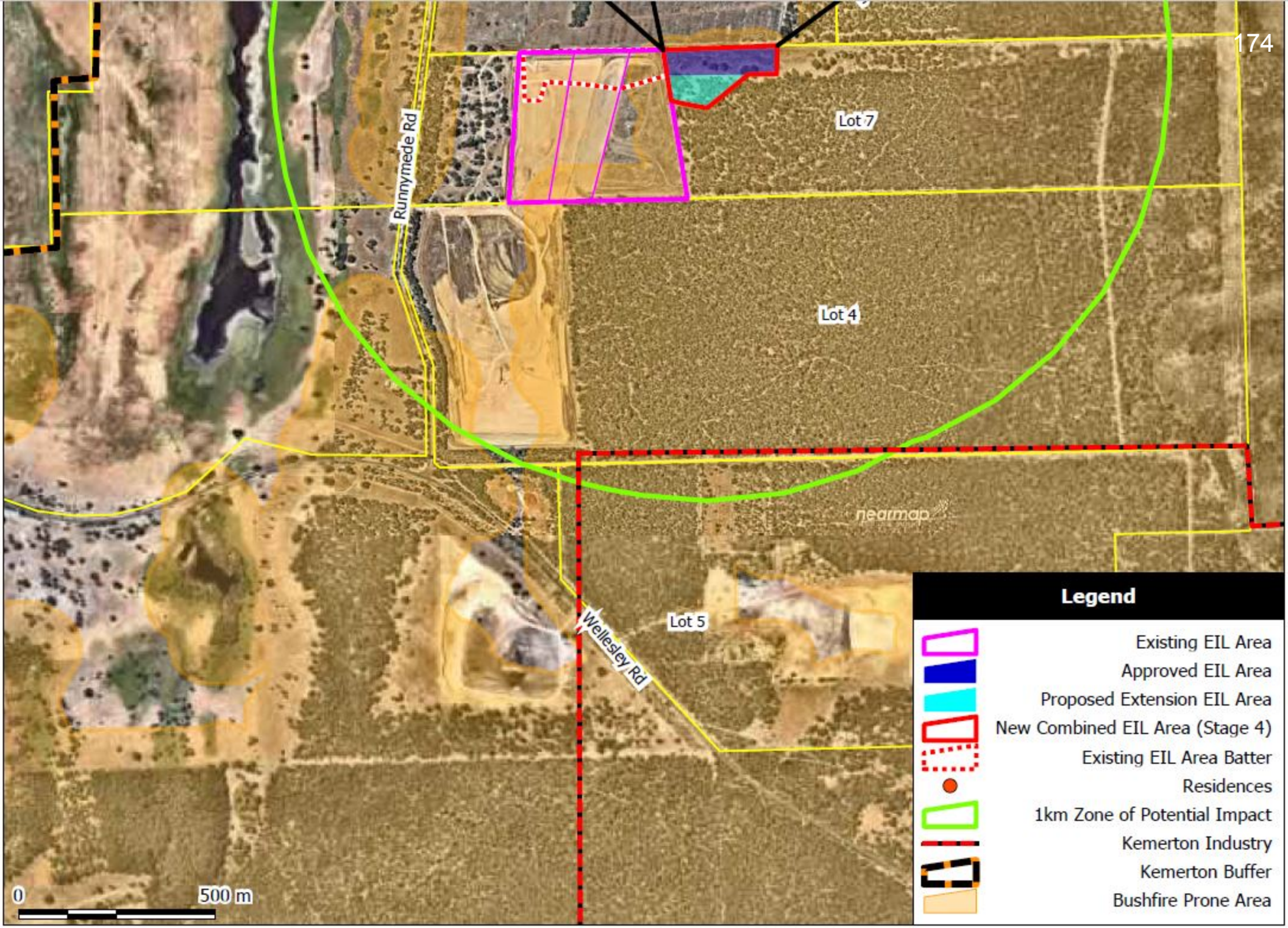
The purpose of a works approval is to allow DWER to assess the environmental acceptability of a proposal's potential to cause emissions and discharges during construction and operation. Note that any works approval or licence issued under Part V of the EP Act will only regulate emissions associated with the category 12 crushing and screening activities (such as dust, noise and contaminated stormwater). It does not extend to the environmental impacts of extracting the material from the ground or transport off-site.

2	N/A	**Issue 2:** Clearing of native vegetation is subject to the *Environmental Protection Act 1986* (EP Act)

		Advice 2: The proponent is to apply for a clearing permit under the EP Act at https://www.der.wa.gov.au/our-work/clearing-permits/46-clearing-permit-application-forms **Discussion 2:** Under section 51C of the Environmental Protection Act 1986 (EP Act), clearing of native vegetation is an offence unless undertaken under the authority of a clearing permit, or the clearing is subject to an exemption. Exemptions for clearing that are a requirement of written law, or authorised under certain statutory processes, are contained in Schedule 6 of the EP Act. Exemptions for low impact routine land management practices outside of environmentally sensitive areas (ESAs) are contained in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (the Clearing Regulations). The following statement is noted in the 'Extractive Industries Licence Application and Environmental Management Plan - Lot 7 Runnymede Road, Wellesley' (Ver 0.1 dated Sept 2021)' (to be referred to as the EIL Report): • "The proposed extension EIL area comprises of remnant native vegetation for which a clearing permit of 0.88ha will be applied for with Department of Water and Environmental Regulation (DWER)." The department understands the above area proposed to be cleared is the 'Extension EIL Area' (which is 1.2ha in size) shown in Figures 2 and 3 of the EIL report (Screenshots 1 & 2). As of 19/10/2021, the Department has not received a clearing permit application for the 'Extension EIL Area. Application forms are available from https://www.der.wa.gov.au/our-work/clearing-permits/46-clearing-permit-application-forms. Additional information on how to apply for a clearing permit is available from https://www.der.wa.gov.au/images/documents/your-environment/native-vegetation/Fact_sheets/Fact_Sheet_-_how_to_apply.pdf Information regarding clearing permit fees can be found here: https://der.wa.gov.au/our-work/clearing-permits/fees/faqs. If further clarification is required, please contact DWER's Native Vegetation Regulation section by email (admin.nvp@dwer.wa.gov.au) or by telephone (6364 7098).
3	N/A	**Issue 3:** Water supply **Advice 3:** The Shire to: • a) impose a condition that the proponent is to quantify their water requirements for all aspects of the proposed extraction and provide evidence of a secure water source, to the satisfaction of the Shire

		• b) note that the Department is currently working with the proponent (B&J Catalano) to finalise their licence amendment to include water use on Lot 7 under their current groundwater license (GWL165046) • c) note that the amended groundwater licence will likely include updated monitoring requirements to manage potential risks to the water resource and other users, including the environment **Discussion 3:** The following statement is noted in the referral: • "A 15kl water cart will be on site during all periods when earth is being moved or screening is being conducted. If dust is generated during these periods, the water cart will be employed to damp down the areas of concern." No information has been provided with regards to the water demand for dust suppression, and other aspects of the proposed extraction activity. The department advises that based on its communication with the proponent: • the water for the proposed extraction activity will be taken from the existing licensed production bore on Lot 4 (groundwater licence: GWL165046), and that the consultant has advised that the water use has been revised to 151,000kL • it is unlikely that the above bore would sustainably yield this proposed volume, and an application for another bore to meet this demand is required into the future The Shire should note that: • the Department is currently working with the proponent (B&J Catalano) to finalise their licence amendment to include water use on Lot 7 under their current groundwater license (GWL165046) • The amended groundwater licence will likely include updated monitoring requirements to manage potential risks to the water resource and other users, including the environment
4	N/A	**Issue 4:** Environmental risks **Advice 4:** The proposed extraction is to be implemented in accordance with DWER's Water quality protection note (WQPN) no. 15 '*Basic raw materials extraction*' where appropriate to the site situation to ensure environmental risks are appropriately mitigated **Discussion 4:** WQPN 15 provides recommendations on how to limit the impacts of their operations to the environment and water resources, to which the proponent is expected to adhere to where appropriate to the site situation (attached for your convenience).
5	N/A	**Issue 5:** Rehabilitation Plan and final landform

		Advice 5: The shire to: • a) Condition that the Rehabilitation Plan be implemented to the satisfaction of the Shire consistent with WQPN 15 and the Guidelines for Preparing Mine Closure Plans[1]. The proponent is to adhere to the intended staging and ensure successful rehabilitation to the final landform and landuse • b) Request the proponent update the 'Final Land Surface and Rehabilitation' plan to include the final landform for the new EIL area **Discussion 5:** The department notes that 'Figure 1: Final Land Surface and Rehabilitation' (Screenshot 3) only covers the final landform of the previous proposed northern extraction area (highlighted deep blue in Screenshot 2), but not the 'Proposed Extensions EIL Area' (highlighted turquoise in Screenshot 2). The following statements are noted in the referral: • "Lot 7 has natural elevations ranging between approximately 12 and 52mAHD (Landgate 2020). There is an existing pit on the property with a final, rehabilitated pit floor elevation of 9 mAHD and batters of 1:6 (Figure 3). The new extraction area is located immediately to the east of the existing pit and slopes gently from 35 mAHD in the east and 26 mAHD in the west (Figure 3)." • "The depth of the excavation of the new EIL area is constrained by the fact that the entire area needs to serve as a batter to the Main Roads pit on Lot 21, with a slope of 1:6. Excavation of the new EIL area will only proceed until a minimum of 16 m AHD is reached in the north western corner. The final landsurface will slope upwards to the north eastern corner which will have final of elevation of 33 m AHD. The levels of this batter will be approximately 6 to 23m above the estimated maximum water table level beneath the new EIL area (approximately 8.5 to 10m AHD), therefore well above the DWER requirements." In view of the above, and in the interest of greater clarity and to confirm the finial pit floor level, the final landform, i.e. 'Figure 1: Final Land Surface and Rehabilitation' (Screenshot 3) should be updated to include the new EIL area.
6	N/A	**File note 1:** Groundwater The proposed extraction is for the southern portion within Stage 4 (Screenshots 1 & 2), noting a minimum of 16 m AHD is proposed for the new EIL area. As the proposal is located on high sandy country where the interception of groundwater would be highly unlikely, DWER views this proposal to be of low risk of groundwater interception.
7	N/A	**File note 2:** noise and dust The department notes that comments related to noise and dust with regards to this DA are not required by the Shire

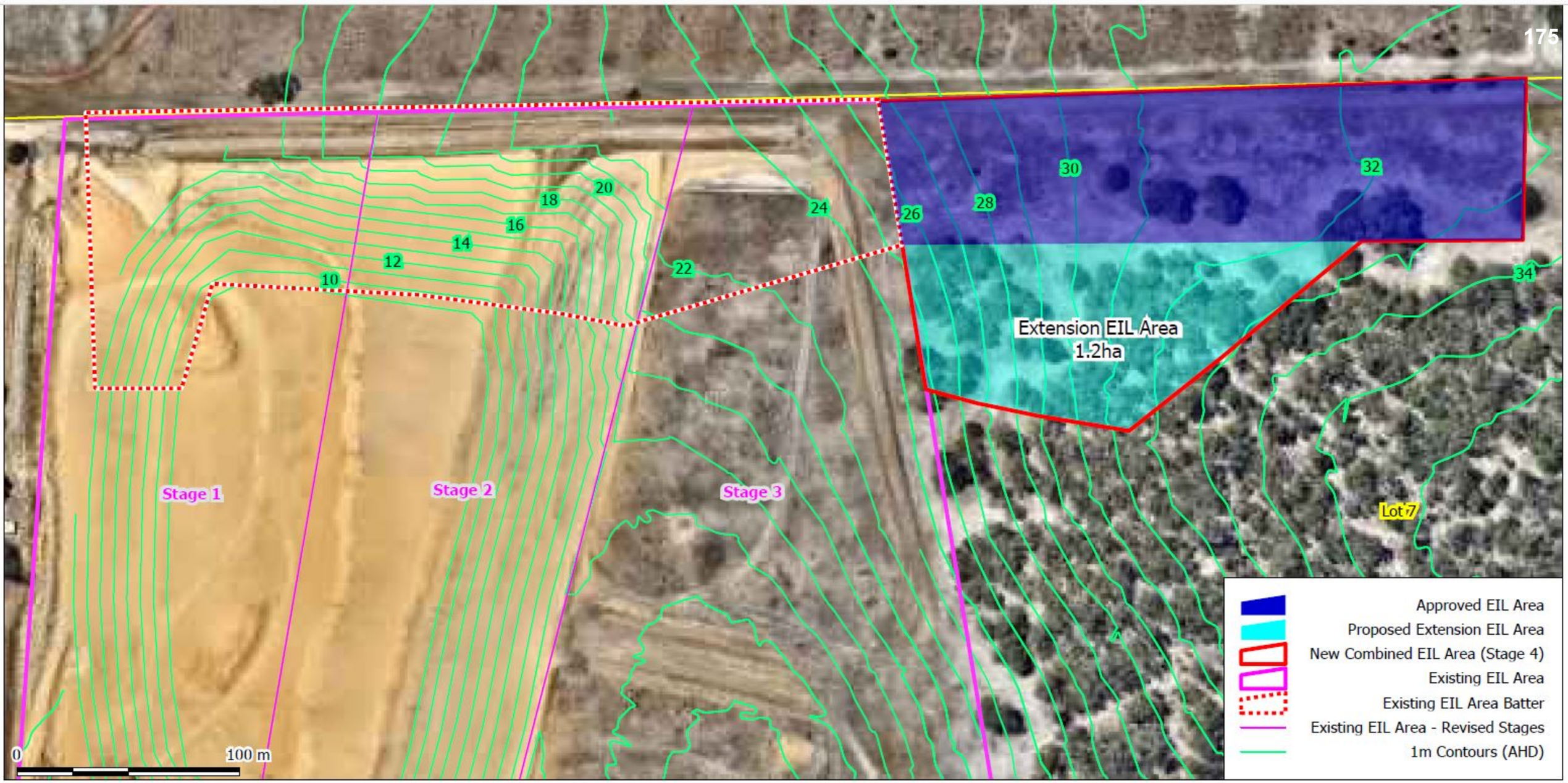


Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863

Scale: 1:16000
Original Size: A4
Air Photo Source: Nearmap Dec 2019
Datum: GDA94

Client: B & J Catalano
Project: Sand Extraction

Figure 2: Site and



Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863, mikelund1@bigpond.com

Scale: 1:2500
Original Size: A4
Air Photo Source: Nearmap Dec 2019
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Rd, Wellesley

Figure 3:
2021 Extension Area

Z:\Catalano\Runnymede Rd Lots 4 & 7_Wellesley_SoH_Sand\Lot 7 Runnymede Rd\EIL\EIL Applications\2021 Amendment Application\Drawings\F3 Lot 7 extraction area latest.map 31-Aug-21

Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863, mikelund1@bigpond.com

Scale: 1:4100
Original Size: A4
Air Photo Source: Nearmap Dec 2019
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Rd, Wellesley

Figure 1:
Final Land Surface and Rehabilitation

SHIRE OF HARVEY

A Breath of Fresh Air

FILE NO: A2575/EX/004
DOC NO: 21/20267
APPLIC NO: P274/21

15 February 2022

B & J CATALANO PTY LTD
SOUTH WESTERN HIGHWAY
BRUNSWICK JUNCTION WA 6224

Dear Sir/Madam,

Proposed EXTRACTIVE INDUSTRY (SAND) [EX/004] - Lot 7 RUNNYMEDE ROAD, WELLESLEY

I refer to your Application for Development Approval dated 30/09/2021 for the proposed EXTRACTIVE INDUSTRY (SAND) [EX/004] at the above property address. Please be advised that Staff, under delegated authority (Delegation No. 9.1.7 & 9.1.2(13)) have refused the application subject to the attached conditions.

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. Further information and review application forms can be obtained by contacting the State Administrative Tribunal on 08 9219 3111 or via their website www.sat.justice.wa.gov.au.

Should you have any queries or require additional information please do not hesitate to contact Neville Dowling, Planning Officer on 9729 0312 or via email nevilled@harvey.wa.gov.au

Kind Regards,

Elizabeth Edwards
Manager Planning Services

Planning and Development Act 2005

SHIRE OF HARVEY
District Planning Scheme No. 1

Notice of determination on application for development approval

Location: 0 RUNNYMEDE ROAD WELLESLEY 6233

Lot:	7	Plan/Diagram:	D040591
Vol. No:	1358	Folio No:	260
Application date:	29/09/2021	Received on:	30/09/2021

Description of proposed development: EXTRACTIVE INDUSTRY (SAND) [EX/004]

The application for development approval is:

☐ Refused for the following reason(s):

The proposal is contrary to the following provisions of Clause 67(2) of the Planning and Development (Local Planning Schemes) Regulations 2015:

a. Does not protect and preserve the more important natural flora and fauna habitats and is therefore contrary to Clause 67(2)(a) and Clause 1.6.1(g) of the Shire of Harvey District Planning Scheme No. 1;

b. Does not:

   i. protect, conserve, and enhance the natural environment;

   ii. ensure the retention and protection of rural land for biodiversity protection;

   iii. protect valued landscapes;

   iv. effectively manage environmental impacts;

   v. manage and improve environmental and landscape attributes;

   and is therefore contrary to Clause 67(2)(c) and the objectives and principles of State Planning Policies 2.0, 2.4 and 2.5;

b. Does not protect significant areas of remnant vegetation or balance the environmental and visual objectives and is therefore contrary to Clauses 67(2) (fa) and the Shire of Harvey's endorsed Local Planning Strategy;

c. Will have a significant effect on the natural environment and is therefore contrary to Clause 67(2)(o);

d. Does not make provision for the preservation of vegetation and is therefore contrary to Clause 67(2)(p); and

f. Has the potential to create irreversible damage to the land quality by creating the potential for erosion and loss of soil and is therefore contrary to Clause 67(2)(q).

Date of determination: 15 February 2022

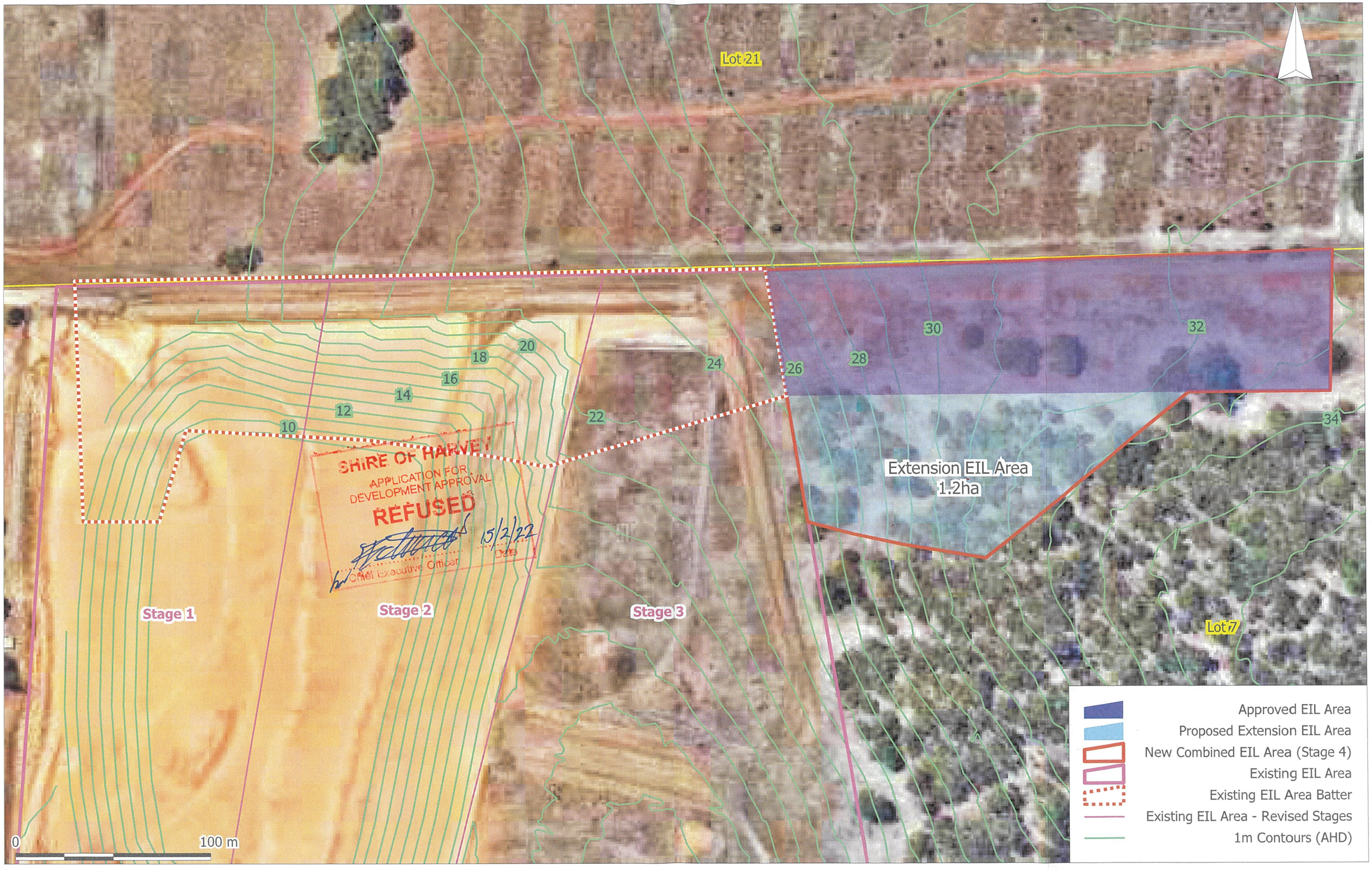
Note 1: If an applicant or owner is aggrieved by this determination, there is a right of review by the State Administrative Tribunal in accordance with the *Planning and Development Act 2005* Part 14. An application must be made within 28 days of the determination.

Signed: .....

for and on behalf of the Shire of Harvey

Dated:

15 February 2022



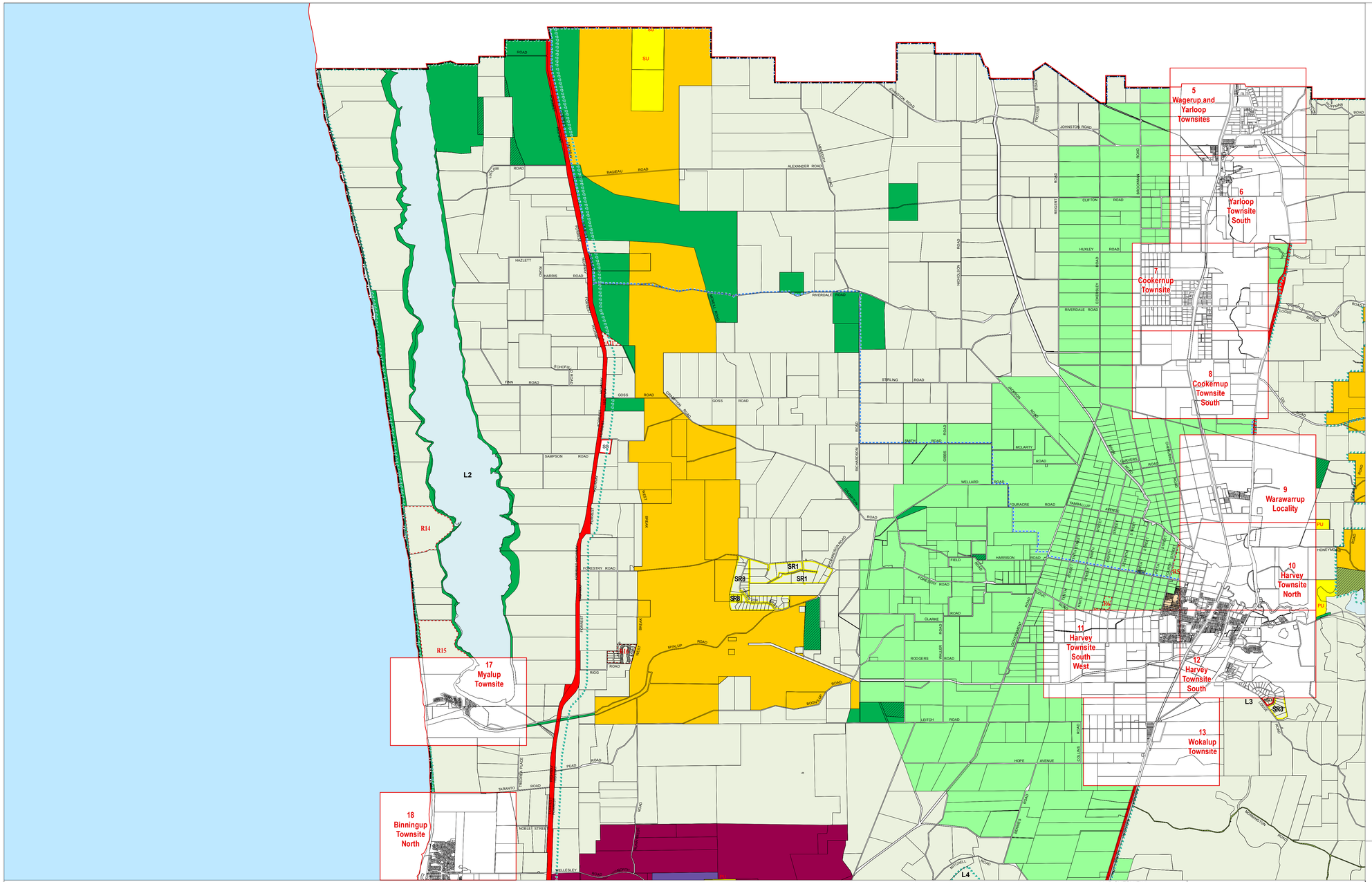
Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863, mikelund1@bigpond.com

Scale: 1:2500
Original Size: A4
Air Photo Source: Nearmap Dec 2019
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B & J Catalano
Project: Sand Extraction
Location: Lot 7 Runnymede Rd, Wellesley

Figure 3:
2021 Extension Area

Z:\Catalano\Runnymede Rd Lots 4 & 7_Wellesley_SoH_Sand\Lot 7 Runnymede Rd\EIL\EIL Applications\2021 Amendment Application\Drawings\F3 Lot 7 extraction area latest.map 31-Aug-21



LEGEND

REGION SCHEME RESERVES (GBRS)

- Other Regional Roads
- Regional Open Space
- Port Installations
- Primary Regional Roads
- Railways
- State Forests
- Waterways
- Public Purposes
- A Public Purposes - Airport
- HS Public Purposes - High School
- H Public Purposes - Hospital
- P Public Purposes - Prison
- PU Public Purposes - Public Utilities
- SU Public Purposes - Special Uses
- TS Public Purposes - Technical School
- U Public Purposes - University

LOCAL SCHEME RESERVES

- Controlled Access Highway
- Important Regional Roads
- Public Purposes
- S Public Purposes : School
- Public Utilities
- Railway
- Recreation

LOCAL SCHEME ZONES

- Forestry
- General Farming
- General Industry
- Intensive Farming
- Kemerton Ancillary Industry
- Kemerton Industry Buffer
- Kemerton Strategic Industry
- Light Industry
- Office
- Other Commercial - Showroom
- Residential
- Residential Development
- Shop
- Special Residential
- Special Rural
- Special Rural - Landscape Protection
- Special Use
- H Special Use : Hotel
- OC Special Use : Other Community
- SS Special Use : Service Station
- Tourist

OTHER CATEGORIES

(see scheme text for additional information)

- Scheme boundary
- Local Government boundary
- R20 R Codes
- A1 Additional uses
- R1 Restricted uses
- **SRes1** Special residential area
- **SR1** Special rural area
- Outline planning area
- **1** Peel - Harvey coastal plain catchment area
- **L1** Place of landscape value
- No zone
- Waterbodies

VERSION No 1

Shire of Harvey

Town Planning Scheme No. 1

(District Scheme)

Department of **Planning, Lands and Heritage**

GOVERNMENT OF WESTERN AUSTRALIA

Whilst all care has been taken to accurately portray the current Scheme provisions, no responsibility shall be taken for any omission or errors in this documentation.

Consultation with the respective Local Government should be made to view a legal version of the Scheme. Please advise the Department of Planning, Lands and Heritage of any omissions or errors in the document at Spatialdata@planning.wa.gov.au

Produced by GeoSpatial Planning Support, Department of Planning, Lands and Heritage

Base Information Supplied by the Western Australian Land Information Authority, SLIP 1096-2018-1

Shire of Harvey

Town Planning Scheme No. 1

(District Scheme)

N

0 1 2 3 4

Kilometers

MAP OVERVIEW

Authorised: T.Servaas

Plot Date: 07 July 2017

G.Gazette: Tuesday, 12 November 1996

Town Planning Scheme Map No. 1 of 28
MAP: Harvey North West

Shire of Harvey

Town Planning Scheme No. 1

(District Scheme)

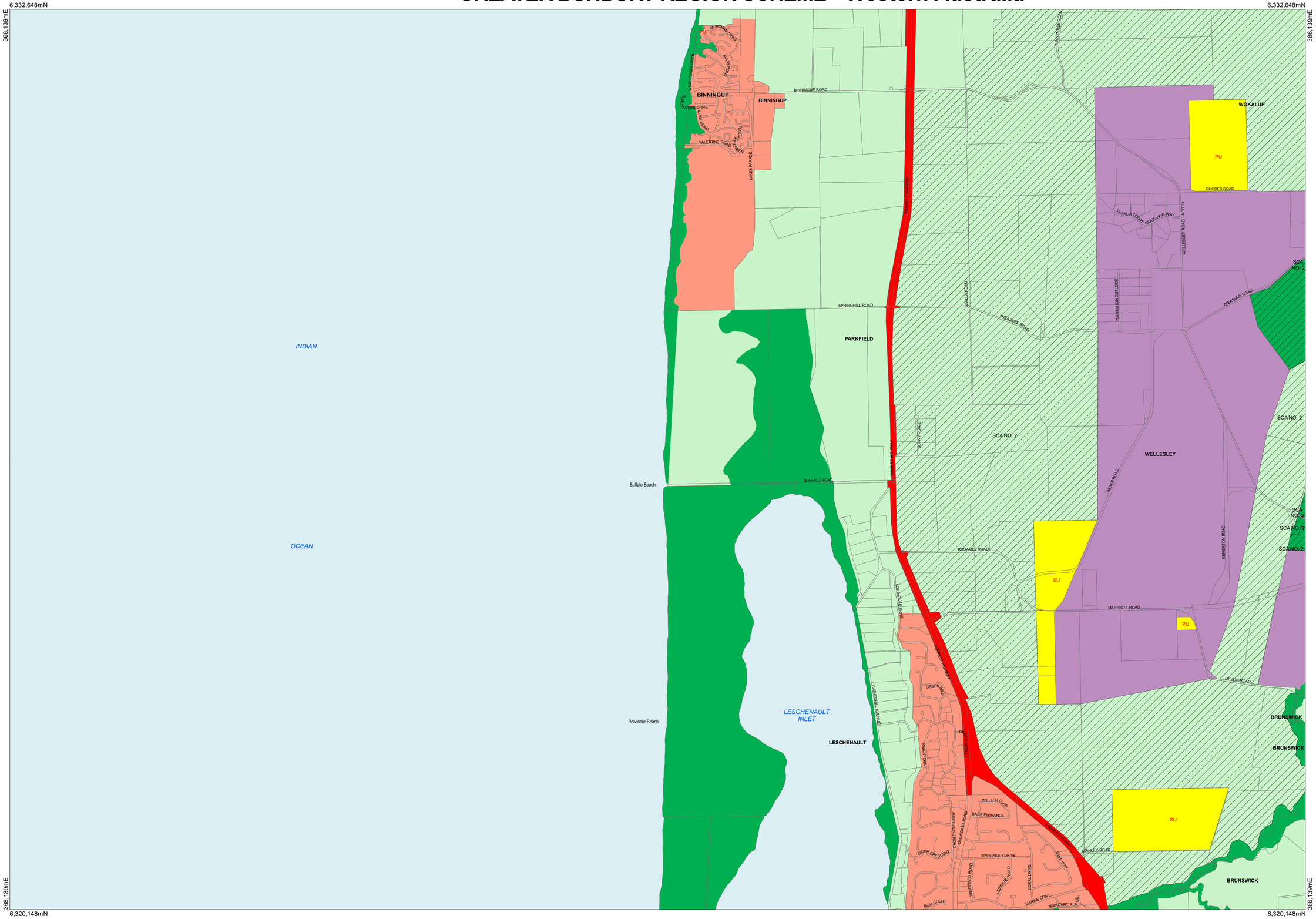
GREATER BUNBURY REGION SCHEME - Western Australia

6,332,648mN

368,139mE

386,139mE

6,320,148mN



Legend

Reserved lands

- Regional open space
- Railways
- Port installations
- State forests
- Waterways
- Public purposes denoted as follows:
  - A Airport
  - HS High school
  - H Hospital
  - P Prison
  - PU Public utilities
  - SU Special uses
  - TS Technical school
  - U University

Reserved roads

- Primary regional roads
- Other regional roads

Zones

- Regional centre
- Industrial
- Industrial deferred
- Private recreation
- Rural
- Urban
- Urban deferred

Special areas

- EC Environmental conditions

Special control areas

- SCA NO. 1 Special Control Area No 1 - water catchments
- SCA NO. 2 Special Control Area No 2 - Kemerton industrial zone buffer area
- SCA NO. 3 Special Control Area No 3 - Glen Iris service corridor buffer area
- SCA NO. 4 Special Control Area No 4 - wastewater treatment plant odour buffer areas

GREATER BUNBURY REGION SCHEME

This map has been derived from an electronic version of the scheme held and maintained by the Department of Planning, Lands and Heritage, Perth WA.

Boundaries to reserved and zoned lands are amended periodically to align with cadastral data, where the intent of the boundaries is to be aligned with cadastral lot boundaries.

This map is one of a set of 23 which depicts the zones and reservations of the Greater Bunbury Region Scheme as adopted on 29 November 2007. The information shown is correct up to the date shown below as far as the Department and the Commission are aware.

Amended to: 16th June 2022

Western Australian Planning Commission

Important notes

This map series forms part of the Greater Bunbury Region Scheme (GBRS), and should be read in conjunction with the Greater Bunbury Region Scheme Text (GBRS Text).

Environmental conditions are shown on these maps; refer to the GBRS Text for details of environmental conditions.

Production notes

Published by the Department of Planning, Lands and Heritage, Gordon Stephenson House, 140 William Street, Perth, WA 6000

The scheme is not intended to indicate the land use allocation under any local government provision.

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Data Sources

Cadastral data: generalised cadastre to show road casement and land parcels greater than 1 hectare. Generated from the Western Australian Land Information Authority Spatial Cadastral Database (SCDB) - permission no. SLIP 1096-2018-1

Technical notes

Horizontal datum - Geocentric datum of Australia 1994

Grid base - Map Grid of Australia

Projection - Transverse Mercator, graphically projected in zone 50

Contacts

Website - www.dplh.wa.gov.au - to access electronic copies of the GBRS

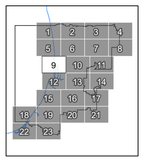
Email - spatialdata@dplh.wa.gov.au for digital data

N

0 0.25 0.5 1 1.5 2

kilometres

INDEX TO ADJOINING MAP SHEETS



GREATER BUNBURY REGION SCHEME MAP 1:25000 MAP SERIES

MAP SHEET 9

MAP NAME:
Binningup to Kemerton

SHIRE OF HARVEY

Local Planning Strategy

GOVERNMENT OF WESTERN AUSTRALIA

Western Australian Planning Commission

Endorsed by the Western Australian Planning Commission

22 April 2020

Disclaimer

This is a copy of the Local Planning Strategy at the date of endorsement produced from an electronic version of the Strategy held by the Department of Planning Lands & Heritage. Whilst all care has been taken to accurately portray the current Strategy provisions, no responsibility shall be taken for any omissions or errors in this documentation.

Consultation with the respective Local Government Authority should be made to view a current legal version of the Strategy.

Please advise the Department of Planning Lands & Heritage of any errors or omissions in this document.

Department of Planning
Gordon Stephenson House
140 William Street
Perth WA 6000

Locked Bag 2506
Perth WA 6001

website: www.dplh.wa.gov.au
email: corporate@dplh.wa.gov.au

tel: 08 6551 9000
fax: 08 6551 9001
National Relay Service: 13 36 77
infoline: 1800 626 477

Version Control

Date	Version	Detail
26/07/2016	July 2016	The Shire of Harvey Local Planning Strategy (Strategy) Part 1 endorsed for advertising for Council.
31/10/2016	October 2016	Referred to WAPC, including copy of Strategy Maps.
25/5/2017	May 2017	Part 2 of the Strategy sent to the WAPC.
28/11/2017	October 2017	Strategy endorsed by the WAPC (18/07/17) subject to modifications to Part 1 and 2, and Strategy Maps. Report to Council to acknowledge the changes and refer back to the WAPC. The updated version of Part 1 and 2 of the Strategy and the Strategy Maps were sent in October 2017.
5/6/2018	June 2018	Additional modifications made in accordance with Schedule of Modifications from WAPC (18/07/17). The updated version of Part 1 and 2 of the Strategy and the Strategy Maps were sent in October 2017.
18/6/2018	June 2018	18 June 2018 - DPLH modifications to conform with WAPC modification requirements
24/1/2020	January 2020	Modifications in accordance with Statutory Planning Committee Minutes of 29/10/2019 (specifically Schedule of Modifications – Attachment 12)
31/3/2020	April 2020	Final modifications as requested by DPLH (14/02/20). General review for grammatical errors and consistency.
06/04/2020	April 2020	Minor modifications as requested by DPLH (03/04/20). Final version.

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Advertising, Adoption & Endorsement

SHIRE OF HARVEY

LOCAL PLANNING STRATEGY

CERTIFICATION FOR ADVERTISING

Certified for advertising by the Western Australian Planning Commission on 18 July 2017.

_____

COUNCIL RECOMMENDED / SUBMITTED FOR APPROVAL

Supported for submission to the Western Australian Planning Commission for endorsement by resolution of the Shire of Harvey at the Ordinary Council Meeting held on 14 May 2019.

_____
SHIRE PRESIDENT

_____
CHIEF EXECUTIVE OFFICER

ENDORSEMENT OF LOCAL PLANNING STRATEGY

Endorsed by the Western Australian Planning Commission on 22 April2020_____

_____
DELEGATED UNDER S.16 OF THE
PLANNING & DEVELOPMENT ACT 2005

1. Vision and Planning Principles

The Shire of Harvey is a diverse region consisting of 42km of coastline, the urbanised locality of Australind, eight rural townsites, a variety of environmentally sensitive areas, a dedicated heavy-industrial park, and a thriving agricultural sector. This diversity creates a complex mixture of opportunities, constraints and community aspirations. The Local Planning Strategy (Strategy) is intended to set out the Shire's broad vision in respect to balancing growth, environmental responsibilities, land use management, appropriate development control, housing affordability and the health and wellbeing of our community. The Strategy will provide a foundation by which the Shire can be protected from unwarranted development proposals and provide a strategic basis for approaching and partnering with State and Federal Government agencies to achieve outcomes which benefit our community.

In support of the values and aspirations identified within the Shire's *Strategic Community Plan 2017 – 2027*, the Shire's vision for the future from a land-use perspective is to actively pursue:

- Appropriate development of the Shire while recognising community needs and the creation and maintenance of a quality lifestyle and environment for all to enjoy;

- Effective delivery of services to ensure that the Shire is a progressive and enjoyable place to live and work; and

- A sustainable balance of rural and urban lifestyle with ecologically sustainable tourism and economic development.

The following Guiding Principles that support this Strategy are:

- To provide a Strategy which provides for the sustainable use of land and water resources in a responsible manner that reflects the aspirations of the Shire and its community, accommodates future needs and creates opportunities to enhance local attributes;

- To provide a Strategy that is consistent with State and regional planning policies and schemes, strategies, structure plans and strategic development initiatives;

- To provide a Strategy that is clear, comprehensive, accessible, informative, logical, practical, transparent and is a 'leadership' document that provides strategic planning directions for the next 15 years and beyond; and

- To provide a Strategy that provides the basis for the preparation of the Shire's new Local Planning Scheme, to be referred to as Local Planning Scheme No. 2 (LPS No. 2).

2. Objectives

The Strategy has been developed with the Objectives of:

- Implementing the State Planning Strategy and the framework of State and regional policies and plans;
- Documenting, in a user-friendly way, community aspirations for the Shire and the strategies, policies and measures which will be required to achieve these aims;
- Providing a comprehensive planning context for responsible decision-making by Council on planning matters and informing the formulation of LPS No. 2;
- Assist employment and economic growth by identifying land suitable for retail, commercial, industrial and tourism uses;
- Minimising the loss of viable rural land for agriculture by identifying land suitable for development and restricting inappropriate rural lifestyle lot development;
- Emphasising the importance of tourism activities and establishing a planning framework which is flexible and conducive to tourism type development;
- Emphasising the importance of a healthy built environment through mixed-use planning and the need to create a variety of destinations, transport methods and urban design initiatives to facilitate a sense of community, wellbeing and improved interaction between residents;
- Ensuring planning appropriately takes into account potential hazards such as flood, fire, erosion and inundation;
- Promoting the sustainable use of water resources by assessing future water needs and initiating investigations and planning to secure a balanced water future;
- Recognising and encouraging conservation of the Shire's cultural heritage wherever possible;
- Recognising places of environmental significance for future consideration by the State as conservation areas / regional open space; and
- Protecting the significant areas of remnant native vegetation, conservation category wetlands and local / regional ecological linkages.

These Objectives will be achieved by providing recommendations for a review of the Shire's District Planning Scheme No. 1 (DPS No. 1) and the preparation of LPS No. 2. Achievement will be further demonstrated through the Shire's ongoing commitment to current and future Community projects and infrastructure upgrading through the affiliated plans which support this Strategy.

2.1 Themes

Aligned with the Vision and Objectives, the following core Themes have been adapted to guide the development of the Strategy and its subsequent implementation:

- Sustained and Diversified Economic Development – Ensuring and developing a broad economic base, new tourism and industrial opportunities and strengthening existing rural, commercial and other economic activities.

- Balanced Growth – Promote and allow for urban growth and the development of affordable housing whilst ensuring the protection of key environmental assets and priority agricultural land.

- Building & Maintaining Infrastructure Capacity – Strategic and urban transport, utilities and communications infrastructure are provided in a timely and efficient manner to cater for a growing resident population and increasing economic activity.

- Heritage and Environment Conservation – Wherever possible identify and encourage the protection of areas that have cultural, historical and environmental significance.

- Strengthening Local Community Development – Providing services and facilities for a range of diverse community needs and interests that reflect and enhance the unique character, heritage and identity of the area.

2.2 Scope

The Shire's Strategy has been prepared with consideration for a 15-year timeframe, which is consistent with other contemporary strategic planning documents, in order to address short, medium and long term strategic goals and development expectations. Strategy Maps for future urban growth and expansion of towns and residential areas within the Shire have been developed with consideration of the Strategy's timeframe. In addition, the Shire has identified possible areas for urban expansion and development that would be worthy for investigation.

The short, medium and long term timeframes have been defined as follows:

- Short term: 0 to 5 years, ready to go - most of the preparation for the site to be developed (land use, zoning and site investigations) has been addressed and will be subject to further structure planning, subdivision or local development plan approvals. Development of these sites should occur within a 0 to 5-year timeframe.

- Medium term: 5 to 10 years, land to be made available – approvals such as Local Scheme Amendments and site investigations will be required to ensure the land is ready for development, however the overall process should be achieved within a development timeframe of 5 to 10 years. Market triggers will determine whether these areas are developed within or beyond the estimated timeframe.

- Long term: 10 to 15 years, urban/industrial land investigations necessary – further environmental, social and economic investigations are required. Complex approvals such as Local and Region Scheme Amendments will need to be undertaken in line with those investigations, if deemed appropriate. Any identified long term site must align with the Greater Bunbury Strategy 2013 (GBS) and Greater Bunbury Region Scheme (GBRS).

***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (s 266B)**

Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community

1. The Threatened Species Scientific Committee (the Committee) was established under the EPBC Act and has obligations to present advice to the Minister for the Environment and Energy (the Minister) in relation to the listing and conservation of threatened ecological communities, including under sections 189, 194N and 266B of the EPBC Act.
2. The Committee provided its advice on the Banksia Woodlands of the Swan Coastal Plain ecological community to the Minister as a draft of this conservation advice. In 2016, the Minister accepted the Committee's advice, adopting this document as the approved conservation advice.
3. The Minister amended the list of threatened ecological communities under section 184 of the EPBC Act to include the Banksia Woodlands of the Swan Coastal Plain ecological community in the **endangered** category. Western Australia recognises components of this ecological community as threatened.
4. Draft sections of this conservation advice, and the proposed conservation category, were made available for expert and public comment for a minimum of 30 business days. The Committee and Minister had regard to all public and expert comment that was relevant to the consideration of the ecological community.
5. This approved conservation advice has been developed based on the best available information at the time it was approved; this includes scientific literature, advice from consultations, and existing plans, records or management prescriptions for this ecological community.

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Conservation objective:

To mitigate the risk of extinction of the Banksia Woodlands of the Swan Coastal Plain ecological community, and maintain its biodiversity and function, through the protections provided under the *Environment Protection and Biodiversity Conservation Act 1999* and through the implementation of priority conservation actions (see section 5, below).

1. DESCRIPTION OF THE ECOLOGICAL COMMUNITY

The ecological community is a woodland[1] associated with the Swan Coastal Plain of southwest Western Australia. A key diagnostic feature is a prominent tree layer of *Banksia*, with scattered eucalypts and other tree species often present among or emerging above the Banksia canopy. The understorey is a species rich mix of sclerophyllous shrubs, graminoids and forbs. The ecological community is characterised by a high endemism and considerable localised variation in species composition across its range.

1.1 Name of the ecological community

This advice follows the assessment of a public nomination to list the 'Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region' as a threatened ecological community under the EPBC Act.

It is recommended that the ecological community be named **Banksia Woodlands of the Swan Coastal Plain**. The name appropriately describes the typical dominant to codominant canopy trees, and the structure[1] and location that characterise the ecological community. The national ecological community includes ecological communities recognised as threatened in Western Australia (see *section 2.4*, below). Throughout this document the full name of the ecological community may be abbreviated to 'Banksia Woodlands' or 'the ecological community'.

1.2 Location and physical environment

The Banksia Woodlands ecological community is located in the southwest of Western Australia, which is recognised as a global biodiversity hotspot (Hopper and Gioia, 2004).

The Banksia Woodlands ecological community is largely restricted to the Perth (SWA02) and Dandaragan (SWA01) subregions of the Swan Coastal Plain IBRA bioregion[2], from around Jurien Bay in the north to Dunsborough in the south. The ecological community also extends into immediately adjacent areas on the Whicher and Darling escarpments (which lie within

[1] The term 'woodland' has been chosen as the most typical structure, but the ecological community may also be considered to include examples of shrubland, open woodland or forest under some classification systems. The percentage canopy cover is more than 2% and typically less than 50%. The structure and appearance may also vary due to disturbance history. Similarly, component species of the dominant upper sclerophyllous layer may be variously considered 'tall or large shrubs' or 'small trees'.

[2] IBRA refers to the Interim Biogeographic Regionalisation of Australia v7 (2012). The Swan Coastal Plain Bioregion is comprised of the Dandaragan Plateau (SWA01) and Perth (SWA02) subregions. Adjacent areas on the Whicher and Darling escarpments are mostly within the Northern Jarrah Forest (JAF01) and Southern Jarrah Forest (JAF02) subregions.

JAF01 and JAF02 subregions of the Jarrah Forests IBRA bioregion), to the south and east, where pockets of Banksia Woodlands may also occur.

The Swan Coastal Plain, Perth subregion, consists of five main geomorphic entities that are roughly located parallel to the coastline (McArthur and Bettenay, 1974; McArthur, 2004). These geomorphic entities include the three coastal sand dune systems with ages increasing inland from the coast:

- the Quindalup System (Holocene; youngest and most westerly, fringing the current coastline);
- the Spearwood System (middle to late Pleistocene); and
- the Bassendean System (late Pliocene to early Pleistocene).

Juxtaposed with these aeolian-formed dune systems, the Pinjarra Plain stretches inland to the Ridge Hill Shelf and is composed of alluvial soils. The Ridge Hill Shelf lies furthest inland and is a narrow strip composed of laterite or sandy-covered spurs that forms the foothills of the Darling Scarp.

The Dandaragan Plateau consists of cretaceous marine sediments mantled by sands and laterites with Banksia woodlands on sands, (whilst heaths and shrublands occur on laterites and gravelly sands).

The Swan Coastal Plain dune systems are generally composed of well-drained and weathered white/cream (Quindalup), pale yellow (Spearwood) or grey (Bassendean) quartz sands, which form coarse-textured soils that are extremely poor in nutrients (McArthur and Bettenay, 1974; McArthur et al., 2004). The Quindalup and, to a lesser extent, Spearwood systems, have a primary carbonate-rich origin, and limestone occurs in the profile and at the base of both dune systems. In contrast, the Bassendean dune system is characterised by deep siliciclastic sands that are not associated with underlying carbonate lithologies (McArthur and Bettenay, 1974; McArthur et al., 2004). The high content of shell fragments and carbonate material in the Quindalup System means that these sands are alkaline, typically in the pH range of 8 to 9. In contrast, Bassendean and Pinjarra soils are acidic, typically in the pH range of 5 to 6 (McArthur et al., 2004). The soils surrounding lower interdunal swamps and lakes are poorly drained and rich in organic matter. On the Dandaragan Plateau sands are slightly acidic rather than basic and in the valleys and slopes where Banksia Woodlands occur.

The Banksia Woodlands ecological community mainly occurs on deep Bassendean and Spearwood sands or occasionally on Quindalup sands, typically at the eastern edge. The ecological community also occurs where there are shallow sands over more complex stratigraphic sequences of the foothills (Ridge Hill Shelf), Whicher Scarp and Gingin/Dandaragan Scarp. The ecological community may also occur in other limited scenarios. For example, localised transitions occur where alluvial, limestone, and other lithic substrates are juxtaposed with Bassendean and Spearwood sands. Unusual examples of Banksia Woodlands also occur on sandflats at some locations, where overbank flows of rivers periodically enrich soil moisture and nutrient status.

In summary, the Banksia Woodlands ecological community:

- typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands;
- is also common on sandy colluvium and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau; and,
- in other less common scenarios, as described above.

The community occurs within an annual rainfall band of approximately 535 to 900 mm on deep sands and 650 to 750 mm on lateritic sands (Beard, 1990). There is a very strong seasonal variation in climate with a clear peak in rainfall during winter and long periods of summer drought (usually five to six months) coupled with high temperatures. Some areas, and some types of Banksia Woodlands are very sensitive to variations in groundwater (Groom et al., 2000; Froend and Drake, 2006). Due to summer drought and vegetation flammability, these are fire prone habitats that include species with a range of life history traits that allow them to persist in this fire prone environment (through resilience to survive fires as well as species that are killed by fire but then germinate after fire).

1.3 Vegetation

1.3.1 Flora

Banksia Woodlands were formerly the dominant vegetation type of the Swan Coastal Plain bioregion, particularly of the Perth subregion (DPaW, 2014b).

The principal structural features of the ecological community are:

- A distinctive upper sclerophyllous layer of low trees[1] (occasionally large shrubs more than 2 m tall), typically dominated or codominated[3] by one or more of the *Banksia* species identified below.
- An emergent tree layer of medium or tall (>10 m) height *Eucalyptus* or *Allocasuarina* species may sometimes be present above the *Banksia* canopy.
- An understory that is often highly species-rich consists of:
  - A layer of sclerophyllous shrubs of various heights; and,
  - A herbaceous ground layer of cord rushes, sedges and perennial and ephemeral forbs, that sometimes includes grasses. The development of a ground layer may vary depending on the density of the shrub layer and disturbance history.

The canopy of the Banksia Woodlands is most commonly dominated or co-dominated by *Banksia attenuata* (candlestick banksia, slender banksia) and/or *B. menziesii* (firewood banksia). Other *Banksia* species that dominate in some examples of the ecological community are *B. prionotes* (acorn banksia) or *B.ilicifolia* (holly-leaved banksia).

Banksia littoralis (swamp banksia) may also be codominant but where it becomes dominant, it typically is not the Banksia Woodlands ecological community as it indicates a different, dampland community. *B. burdettii* (Burdett's banksia) is more common on the Dandaragan

[3] Refers to relevant *Banksia* species typically being amongst the most common plant species in the upper sclerophyllous layer. There may be localised exceptions to this, either as natural variation or due to disturbance history (e.g. fire). To determine presence of the ecological community, refer to *section 2. Guidance for determining whether the Banksia Woodlands ecological community protected under the EPBC Act is present.*

Plateau where it is often a co-dominant, but being a large shrub where it becomes dominant, it typically forms a tall shrubland and not the Banksia Woodlands ecological community.

Other trees of a medium height that may be present, and may be codominant with the *Banksia* species across a patch, include *Eucalyptus todtiana* (blackbutt, pricklybark), *Nuytsia floribunda* (Western Australian Christmas tree), *Allocasuarina fraseriana* (western sheoak), *Callitris arenaria* (sandplain cypress), *Callitris pyramidalis* (swamp cypress) and *Xylomelum occidentale* (woody pear).

Emergent taller trees that can occur above the *Banksia* canopy may include *Corymbia calophylla* (marri), *Eucalyptus gomphocephala* (tuart) and *E. marginata* (jarrah).

Key species in the sclerophyllous shrub layer of the ecological community include members of the families Asteraceae, Dilleniaceae, Ericaceae, Fabaceae, Myrtaceae and Proteaceae. Widespread species include *Adenanthos cygnorum* (woolly bush), *Allocasuarina humilis* (dwarf sheoak), *Bossiaea eriocarpa* (common brown pea), *Conostephium pendulum* (pearl flower), *Daviesia* spp., *Eremaea pauciflora*, *Gompholobium tomentosum* (hairy yellow pea), *Hibbertia hypericoides* (yellow buttercups), *Jacksonia* spp., *Kunzea glabrescens*, *Petrophile linearis* (pixie mops), *Philotheca spicata* (pepper and salt), *Stirlingia latifolia* (blueboy), *Phlebocarya ciliata*, *Hypolaena exsulca* and *Xanthorrhoea preissii* (balga).

Key species in the herbaceous ground layer include members of the families Cyperaceae, Droseraceae, Haemodoraceae, Orchidaceae, Restionaceae and "lilies" from various families. Widespread species include *Amphipogon turbinatus* (tufted beard grass), *Burchardia congesta* (milkmaids), *Caladenia* spp. (spider orchids), *Dasypogon bromeliifolius* (pineapple bush), *Desmocladus flexuosus*, *Drosera erythrorhiza* (red ink sun dew), *Lepidosperma squamatum*[4] (a tufted sedge), *Lomandra hermaphrodita*, *Lyginia barbata* (southern rush), *Lyginia imberbis*, *Mesomelaena pseudostygia* (semaphore sedge), *Patersonia occidentalis* (purple flag), *Podolepis* spp., *Stylidium brunonianum* (pink fountain trigger plant), *Stylidium piliferum* (common butterfly trigger plant), *Trachymene pilosa* (dwarf parsnip), and *Xanthosia huegelii* (heath xanthosia).

Consistent with observations across most of the Southwest Australian Floristic Region (Hopper and Gioia, 2004; Hopper, 2009), Banksia Woodlands are characterized by a high species richness (α-diversity) and high species geographic turnover (ß-diversity) in the shrub and herbaceous layers. Despite the common structural features of the ecological community across the Swan Coastal Plain bioregion, which include a canopy dominated or codominated by *Banksia* species and a species-rich shrub and herbaceous understorey, only a small proportion of the understorey species are widespread (see above). Many understorey species are locally endemic and most do not occur across the full range of the ecological community.

The floristic diversity in Banksia Woodlands is primarily associated with the understorey. While around 15 native trees are associated with the overstorey, surveys have recorded more than 600 native plant taxa from 233 sampled points on the Swan Coastal Plain that contain

[4] *Lepidosperma angustatum* may be listed in previous studies as occurring in Banksia Woodlands, but recent taxonomic changes means that it is now considered to be largely restricted to the south coast of WA.

one or more of the four characteristic *Banksia* tree species – *B. menziesii*, *B. attenuata*, *B. prionotes* and/or *B. ilicifolia*. An average of 50 plant taxa have been recorded within 100 m^2 sample plots of Banksia Woodlands in the Perth area (Keighery and Keighery, 2016).

1.3.2 Variability

In addition to the high species geographic turnover (ß-diversity) noted above, the Banksia Woodlands ecological community shows north–south and east–west gradients in species distribution. The structure (height, cover, density) and composition of Banksia Woodlands varies in relation to three major environmental gradients.

- *Rainfall gradient.* The composition and vegetation structure of the community changes as rainfall increases from north to south, and to a lesser extent, west to east. At the northern end of the ecological community's distribution, where rainfall is lower, Banksia Woodlands may exhibit lower tree height and density, gradually intergrading with Kwongan heath, which occupies upper slopes and ridges (sometimes on laterite without a sand mantle), while Banksia Woodlands are increasingly confined to lower slopes and deeper sands (Beard, 1989). In the central and southern areas of the ecological community's distribution, where rainfall is higher, Banksia Woodlands include mixed assemblages of *Eucalyptus, Allocasuarina* and *Banksia* in the canopy or subcanopy. These mixed stands also occur on the eastern Swan Coastal Plain where rainfall is higher due to orographic effects of the Gingin Scarp and Darling Scarp.
- *Soil (or Edaphic) gradient*. As described above (see *1.2 – Location and physical environment*), the Banksia Woodlands mainly occur on the Bassendean and Spearwood coastal sand dune systems and, to a lesser extent, the Quindalup dune system. Species richness generally increases in an easterly direction with the lowest diversity on the youngest sands (Quindalup) and the highest on the oldest sands (Bassendean). There are some other floristic differences between the Bassendean and Spearwood dunes, for example, *Eucalyptus gomphocephala* (tuart) occurs only as an emergent tree on Spearwood sands. The ecological community does not typically occur on alluvial, granite, limestone, laterite and other lithic substrates. The sandy deposits of the Dandaragan Plateau are mainly of colluvial and alluvial origin, but also include minor marine deposits from ancient shorelines and re-worked sediments from further west on the Swan Coastal Plain. Localised transitions occur where these substrates are juxtaposed with Bassendean and Spearwood sands. Unusual examples of Banksia Woodlands occur on sandflats at some locations, where overbank flows of rivers periodically enrich soil moisture and nutrient status. These woodlands have an understorey dominated by ephemeral forbs and a relatively low diversity and density of shrubs, unlike most other forms of the community.
- *Topographic gradient*. Banksia Woodlands typically occur on the tops and slopes of sand dunes, but do not occur on clay flats.

Groundwater levels, groundwater quality, and seasonal fluctuations of groundwater flows interact with the above factors, to influence the structure and composition of the Banksia Woodlands. The dominant *Banksia* species in the woodlands are generally opportunistic phreatophytes (deep-rooted species) and in many areas obtain at least part of their water needs from groundwater at the water table (where the water table is close to the surface), but the depth at which groundwater can be exploited varies greatly between species. This leads to compositional changes in the dominant Banksia species in the dunal landscape depending on water table depth. Typically, *Banksia littoralis* and *B. ilicifolia* are confined to seasonal damplands in interdunal swales where the water table is less than five metres deep throughout the year, whereas other species occur at higher elevations on the dunes. The extent to which *Banksia attenuata* in particular is groundwater dependent decreases with increasing water table depth, and this species is generally unable to access groundwater in areas where the water table depth is more than about 30 metres (Zencich et al., 2002).

The composition of the Banksia Woodlands, particularly in the shrub and ground layers, can exhibit a high degree of variation across short distances (e.g < 500m). Encompassing this variation, floristic sub-communities described on the Swan Coastal Plain, reflecting similarities in geography and soil type, are assigned to Banksia Woodlands (Gibson et al., 1994). (Table 1, adapted from Government of Western Australia, 2000).

In addition to variation due to environmental gradients, the structure and composition of the ecological community may vary from that described above due to natural or human-induced disturbance, including fire. The *key diagnostic characteristics* (*section 2.2.1*) help determine if the ecological community is present at a site that has undergone recent disturbance.

A number of vegetation communities or floristic community types are encompassed within the Banksia Woodlands ecological community. Some of these sub-communities within the Banksia Woodlands are highly restricted and listed as Threatened or Priority ecological communities in Western Australia. These have higher significance than sub-types known to be more common and should be provided specific or additional protection, particularly where assigned a higher threat rank than the Banksia Woodlands listing.

Further detail on each of these floristic community types is provided in *Appendix B – Detailed information on sub-communities*, to provide information to assist with consideration of particular sites of the ecological community.

Table 1: Floristic Community Types with relationships to the Banksia Woodlands ecological community

Refer to *Appendix C – Detailed description of national context* for further information on each Floristic Community Type.

Note:

- a number of these Floristic Community Types are not mapped, and the studies only surveyed Banksia Woodlands south of the Moore River, hence other types of Banksia Woodlands outside the study areas are not included in the table. Floristics of the Banksia Woodlands in the northern portion of the Swan Coastal Plain have not been identified to the same level of detail and floristic community types are therefore not described below for that portion of the community's range. Griffin (1990, 1994) provide descriptions of some of the Banksia woodland assemblages in the northern portion of the Swan Coastal Plain; and,
- *FCT 20c Eastern shrublands and woodlands corresponds with a separate EPBC ecological community listing, Shrublands and Woodlands of the eastern Swan Coastal Plain. Occurrences of this FCT should be considered under that separate listing (Department of the Environment, 2016).

FCT	FCT name	Distribution	ASR	WA TEC
Supergroup 3 – Uplands centred on Bassendean Dunes and Dandaragan Plateau				
20a	*Banksia attenuata* woodlands over species rich dense shrublands	PMR+/S	64.5	EN (WA)
20b	Eastern *Banksia attenuata* and/or *Eucalyptus marginata* woodlands	PMR+/N	59.7	EN (WA)
*20c	Eastern shrublands and woodlands	PMR	60.4	CR (WA); EN (EPBC Act)
21a	Central *Banksia attenuata - Eucalyptus marginata* woodlands	≥PMR/N	52.0	
21b	Southern *Banksia attenuata* woodlands		57.5	P3
21c	Low lying *Banksia attenuata* woodlands or shrublands	PMR+	38.5	P3
22	*Banksia ilicifolia* woodlands	>PMR/C	30.0	P2
23a	Central *Banksia attenuata - Banksia menziesii* woodlands	PMR	59.0	
23b	Northern *Banksia attenuata - Banksia menziesii* woodlands	>PMR/S	47.0	P3
23c	North-eastern *Banksia attenuata - Banksia menziesii* woodlands	(PMR)	53.0	
S9	*Banksia attenuata* woodlands over dense low shrublands	(PMR)/S	*38.9*	
Supergroup 4 – Uplands centred on Spearwood and Quindalup Dunes				
24	Northern Spearwood shrublands and woodlands	PMR*	38.9	P3
25	Southern *Eucalyptus gomphocephala – Agonis flexuosa* woodlands	>PMR/S	48.1	P3
28	Spearwood *Banksia attenuata* or *Banksia attenuata - Eucalyptus* woodlands	>PMR/S	55.1	
Whicher Scarp FCTs (Keighery et al., 2008)				
A1	Central Whicher Scarp Mountain Marri Woodland WHSFCT_A1 (Keighery et al., 2008 indicates *B.attenuata* is a dominant)	Whicher Scarp	63.6	P1

FCT	FCT name	Distribution	ASR	WA TEC
A2	North Whicher Scarp Jarrah and Woody Pear woodland WHSFCT_A2 (Keighery et al., 2008 indicates *B.attenuata* is a dominant)	Whicher Scarp ±	79.6	
A3	North Whicher Scarp Banksia and Woody Pear woodland WHSFCT_A3 (Keighery et al., 2008 indicates *B.attenuata* is a dominant)	Whicher Scarp	62.5	
A4	Whicher Scarp *Banksia grandis*, Jarrah and Marri woodland WHSFCT_A4 (Keighery et al., 2008 indicates *B.attenuata* is a dominant)	Whicher Scarp	68.0	
B1	Swan Coastal Plain /North Whicher Scarp *Banksia attenuata* woodland WHSFCT_B1 (Keighery et al., 2008 indicates *B.attenuata* is a dominant)	Whicher Scarp ±	55.6	
B2	West Whicher Scarp *Banksia attenuata* woodland WHSFCT_B2 (Keighery et al., 2008 indicates *B.attenuata* is a dominant)	Whicher Scarp ±	34.0	P1
C2	Whicher Scarp Jarrah woodland on deep coloured sands WHSFCT_C2 (Keighery et al., 2008, indicates *B.attenuata* is generally present and often dominant)	Whicher Scarp	67.3	P1

Source: Gibson et al. (1994); Government of Western Australia, 2000; Keighery et al. (2008); Urban Bushland Council, 2011.

Legend to table

Column 1: FCT (Floristic Community Type) Codes

The numbers of the types additional to Gibson *et al.* (1994) are italicised if they are subsets of an existing group (in types 19, 20, 23 and 30) and italicised and preceded by an S if they are supplementary groups.

Column 2: FCT name and General Description

Descriptions are based on generalised information from all plots in the group. Structural units are categorised into forest, woodlands, shrublands, sedgelands and herblands after Gibson *et al.* (1994).

Column 3: Distribution in relation to the Perth Metropolitan Region

PMR	confined to PMR	N	Northernmost location in the PMR
PMR+	predominantly in PMR	S	Southernmost location in the PMR
(PMR)	rare in PMR	C	PMR central to distribution
blank	outside PMR		
>PMR	distribution goes well beyond the PMR		
	* except for isolated occurrence outside normal range		

Column 4: ASR (Average Species Richness) per Floristic Community Type

Average species richness per 10m x 10m plot, excluding those species only occurring in a single plot (single records). Some community types can have a high proportion of single records and these estimates of average species richness are underestimates in some cases (Gibson et al., 1994).

Column 5: WA TEC (Threatened and Priority Ecological Communities in WA)

CR = Critically Endangered; EN = Endangered; P1, P2, P3 = WA priority ecological community categories

1.4 Fauna

Banksia Woodlands support a rich and diverse array of fauna species on the Swan Coastal Plain.

Forty indigenous mammal species were considered to have occurred in the Swan Coastal Plain bioregion at the time of non-Indigenous settlement, including iconic species such as the bilby, numbat and woylie (Burbidge et al., 2009). Ten of these mammal species are now entirely extinct from the bioregion. With regard to the native ground mammal fauna known from the Swan Coastal Plain at the time of non-Indigenous settlement, over 70 % have become regionally extinct (Kitchener et al., 1978). Other species have declined in numbers or contracted their range, generally to the northern plain, which is relatively less disturbed. The larger patches of Banksia Woodlands can still support viable populations of *Tarsipes rostratus* (Noolbenger, honey possum), and *Pseudomys albocinereus* (Noodji, ash-grey mouse). Being nectar feeders, Noolbenger particularly rely on *Banksia* flowers as a food resource and have a key role in the ecological community as pollinators.

The extended flowering phenology of the dominant *Banksia* species plays a significant role in maintenance of nectar feeding bird populations that rely on all-year-round flowering for their food, successful breeding and persistence. The bird assemblages of the Swan Coastal Plain is numerically dominated by nectrivores (How and Dell, 2000). However, the most iconic bird species of the Swan Coastal Plain are the black cockatoos: *Calyptorhynchus latirostris* (Carnaby's black cockatoo), *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo, karrak) and *Calyptorhynchus baudinii* (Baudin's black cockatoo). Carnaby's black cockatoo typically breeds in eucalypt forests and woodlands in the wheatbelt, east of the coastal plain, but migrates to the coast each year, where they feed upon the flower and fruiting cones of *Banksia* and related species within the ecological community. In so doing, they help to disperse any seeds not directly eaten, sometimes over several kilometres.

The Swan Coastal Plain is exceptional in its reptile species richness (How and Dell, 2000). Some reptile species are endemic to the Swan Coastal Plain, such as *Lerista lineata* (Perth slider, Perth lined lerista) and *Neelaps calonotus* (black-striped snake) while other species are near-endemics, such as *Ctenophorus adelaidensis* (western heath dragon, sandhill dragon), *Delma concinna* (javelin lizard), *Diplodactylus polyophthalmus* (spotted sandplain gecko), *Lerista christinae* (bold-striped slider) and *Pletholax gracilis* (keeled legless lizard). There is a marked change in the reptile assemblages across the Swan Coastal Plain that reflect the underlying sandy soil structure of the differing Quindalup, Spearwood and Bassendean landforms and the Banksia Woodlands that dominate them. The fossorial turtle frog (*Myobatrachus gouldii*) is a highly unusual amphibian species in this ecosystem, as it is associated with Banksia Woodlands due to its diet. The turtle frog eats termites that feed on *Banksia* wood (Callaby, 1956). However, the implications of the turtle frog's preying upon the termites to the Banksia trees is not yet fully understood.

Some characteristic vertebrate species currently known to occur in the ecological community include:

Mammals:

Tarsipes rostratus (Noolbenger, honey possum)
Pseudomys albocinereus (Noodji, ash-grey mouse)
Macropus irma (Kwoora, western brush wallaby)
Isoodon obesulus (quenda)

Birds:

Acanthorhynchus superciliosus (western spinebill)
Anthochaera carunculata (red wattlebird)
Anthochaera lunulata (western wattlebird)
Calyptorhynchus banksii naso (forest red-tailed black cockatoo)
Calyptorhynchus baudinii (Baudin's cockatoo)
Calyptorhynchus latirostris (Carnaby's cockatoo)
Lichmera indistincta (brown honeyeater)
Malurus splendens (splendid fairy-wren)
Pachycephala rufiventris (rufous whistler)
Petroica boodang (scarlet robin)
Phylidonyris niger (white-cheeked honeyeater)
Phylidonyris novaehollandiae (New Holland honeyeater)
Zosterops lateralis chloronotus (western silvereye)

Reptiles:

Ctenophorus adelaidensis (western heath dragon, sandhill dragon)
Ctenotus australis (western limestone ctenotus)
Ctenotus inornatus (syn. *Ctenotus fallens*) (west-coast laterite ctenotus)
Delma concinna (javelin lizard)
Diplodactylus polyophthalmus (spotted sandplain gecko)
Hemiergis quadrilineata (two-toed earless skink)
Lerista christinae (bold-striped slider)
Lerista elegans (elegant slider)
Lerista lineata (Perth slider, Perth lined lerista)
Morethia lineoocellata (west coast morethia)
Neelaps calonotus (black-striped snake)
Pletholax gracilis gracilis (keeled legless lizard)

Frogs:

Heleioporus eyrei (moaning frog) and *Limnodynastis dorsalis* (pobblebonk) are dependent on Banksia Woodlands for a significant portion of their lifecycle, as non-breeding aestivating habitat. On the Swan Coastal Plain *Myobatrachus gouldii* (turtle frog) only occur in Banksia Woodlands, so the ecological community provides breeding habitat and their entire lifecycle

is completed there. Their direct-developing eggs hatch underground amongst the banksia roots (Mitchell, *pers. comm.*).

The invertebrate component of the ecological community is less well known than the vertebrates. Several endemic taxa are known from localised woodlands on the Swan Coastal Plain and there is a clear biogeographic association between some invertebrate groups and landform types that underpin the dominant Banksia Woodlands (Harvey et al., 1997). In southwestern Australia, pollinating and herbivorous insects exhibit relationships with plants species that are host-specific to varying degrees, and it is highly likely that biota of the Banksia Woodlands also exhibit host-specificity contributing to endemism at the community level. Most of these relationships remain to be documented and studied.

Some examples of patterns of invertebrate diversity associated with Banksia Woodlands include:

- *Synemon gratiosa* (graceful sun moth)
- Endemic *Antichiropus* millipedes
- Pollination of some rare orchids in the region is dependent on various species of thynnid wasps such that each wasp species targets a particular species of orchid (Swarts and Dixon, 2009).
- At least 38 native species of earthworms are estimated to occur in the Perth metropolitan region of the Swan Coastal Plain, with diversity increasing away from the coast (Abbott and Wills, 2002). Native earthworm species in the Perth metropolitan region are under-represented in disturbed areas (e.g. garden samples), where they are largely replaced by introduced species. Introduced species were not found in undisturbed remnants (Abbott, 1982). This suggests that urban development has been detrimental to the native earthworm fauna and that remnant vegetation fragments will continue to provide refuges in the future (Abbott and Wills, 2002).
- Abensperg-Traun and Perry (1995) detail 16 termite species found in Banksia Woodlands adjacent to the Gnangara Pine Planation. The genera recorded in Banksia Woodlands but not in adjacent pine plantations were *Kalotermes*, *Microcerotermes*, *Nasutitermes*, *Occasitermes* and *Paracapritermes*.
- Various genera and species of ants are specifically noted as occurring in Banksia Woodlands by Heterick (2009). *Dolichoderus* species are particularly abundant in Banksia Woodlands north and south of Perth. *Myrmecia clarki*, a small, dark ant with yellow mandibles also is quite common in Banksia Woodlands around Perth. Other ant species observed foraging on *Banksia* or in *Banksia* woodlands include: *Camponotus johnclarki*, *Camponotus chalceus*, various species of *Stigmacros* in the Perth area, *Amblyopone clarki* and *Austroponera rufonigra* (syn. *Pachycondyla rufonigra*).

1.5 Fungi

The Swan Coastal Plain is rich in fungi species. There have been no comprehensive surveys of fungi in Banksia woodlands across the Swan Coastal Plain, though survey data for fungi

are available for some reserves and sites in the Perth region (Bougher, 2011; Perth Urban Bushland Fungi, 2011). Table 2 lists some fungi species of conservation significance.

Table 2: Some of the fungi species in the Banksia Woodlands and their conservation status in Western Australia.

Species	Priority rating
Amanita carneiphylla	P2
Amanita drummondii	P3
Amanita fibrillopes	P3
Amanita griseibrunnea	P2
Amanita quenda	P1
Amanita wadjukiorum	P3
Amanita walpolei	P2
Lecania sylvestris	P2

2. GUIDANCE FOR DETERMINING WHETHER THE BANKSIA WOODLANDS ECOLOGICAL COMMUNITY PROTECTED UNDER THE EPBC ACT IS PRESENT

2.1 Introduction

National listings complement State vegetation laws by enhancing the protection of those components of Australia's biodiversity most at risk of extinction. With regards to ecological communities, national listings focus legal protection on patches that remain in relatively good condition, and retain their natural composition and ecological function to a large degree.

The Banksia Woodlands ecological community encompasses considerable natural variation across its range, as recognised by the identification of several intergrading floristic community types (regarded here as 'sub-communities' within the national ecological community). The ecological community is also subject to varying degrees of disturbance and degradation that have influenced the quality of a patch. Notably, the ecological community occurs in a highly cleared and modified landscape. Both the natural variation and influence of degradation have been taken into account in developing the key diagnostic characteristics and condition thresholds for the Banksia Woodlands.

The key diagnostic characteristics presented here summarise the main features that characterise the Banksia Woodlands ecological community. These are intended to aid the identification of the ecological community, noting that a broader description is given in earlier sections.

Condition categories recognise that patches of an ecological community can differ in their quality, and that some patches have undergone sufficient degradation. Condition thresholds provide guidance on when a patch of an ecological community retains sufficient conservation values to be considered a 'Matter of National Environmental Significance', as defined under the EPBC Act. Patches that do not meet the minimum condition thresholds, therefore, are excluded from full national protection, and this effectively means that the referral, assessment and compliance provisions of the EPBC Act are focussed on the most valuable elements of the ecological community.

Although very degraded or modified patches of an ecological community are not protected under the EPBC Act, it is recognised that some patches can still retain some important natural values that may be crucial for certain species or habitats. Such sites may also be protected through State and local laws or schemes. Therefore, these patches should not be excluded from recovery and other management actions. Suitable recovery and management actions may improve some of these patches to the point that they may be regarded as part of the ecological community fully protected under the EPBC Act. Management actions should, where feasible, also aim to restore patches to meet any high quality condition thresholds where these are outlined.

For EPBC Act referral, assessment and compliance purposes, the national ecological community is limited to patches that meet the following key diagnostic characteristics, condition thresholds, and minimum patch sizes:

Step 1: use the key diagnostic characteristics to determin if the ecological community is present – *section 2.2.1*;

Step 2: determine the condition of the patch using Table 2 – *section 2.2.2*;

Step 3: consider if the patch meets a minimum size threshold – *section 2.2.3*;

Step 4: the surrounding context of a patch must also be taken into account when considering factors that add to the importance of a patch that meets the condition thresholds – *section 2.2.4*).

Note: boundaries for a patch may extend beyond a site boundary or potential area of impact for a proposed action.

2.2 Key diagnostic characteristics and condition thresholds

2.2.1 Step 1: Key diagnostic characteristics

These key diagnostic characteristics are the first step in identifying the Banksia Woodlands ecological community, acknowledging that the ecological community encompasses a number of recognised sub-communities (e.g. Floristic Community Types). Some of these sub-communities have a higher threatened status, where listed individually on the WA lists of threatened and priority ecological communities (WA TECs, PECs) (see *Appendix B – Detailed information on sub-communities* for further details on each sub-community). Consequently, the condition thresholds (and thresholds for Significant Impact decisions) may differ for some sub-communities of the Banksia Woodlands ecological community.

Location and physical environment:

- The Banksia Woodlands ecological community primarily occurs in the Swan Coastal Plain IBRA bioregion.
  - This covers the coastal plain from around Jurien Bay south, through Perth, to around Dunsborough. It also includes the Dandaragan Plateau.
  - Pockets of the Banksia Woodlands ecological community also extend into the adjacent lower parts of the Darling and Whicher escarpments that lie within the Jarrah Forest IBRA bioregion to the immediate east and south of the Swan Coastal Plain.

AND

Continued on next page

Soils and landform:

- The Banksia Woodlands ecological community:
    - typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands;
    - is also common on sandy colluvium and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau; and,
    - in other less common scenarios (e.g. tranisitional substrates, sandflats), as described under *Section 1.2*.

AND

Structure:

- The structure of the ecological community is a low woodland to forest (see footnote [1], page 5) with these features:
    - A distinctive upper sclerophyllous layer of low trees[1] (occasionally large shrubs more than 2 m tall), typically dominated or codominated[3] by one or more of the *Banksia* species identified below; AND
    - Emergent trees of medium or tall (>10 m) height *Eucalyptus* or *Allocasuarina* species may sometimes be present above the *Banksia* canopy; AND
    - A often highly species-rich understorey that consists of:
        - a layer of sclerophyllous shrubs of various heights; and,
        - a herbaceous ground layer of cord rushes, sedges and perennial and ephemeral forbs, that sometimes includes grasses. The development of a ground layer may vary depending on the density of the shrub layer and disturbance history.

AND

Composition:

- The canopy is most commonly dominated or co-dominated by *Banksia attenuata* (candlestick banksia, slender banksia) and/or *B. menziesii* (firewood banksia). Other *Banksia* species that dominate in some examples of the ecological community are *B. prionotes* (acorn banksia) or *B.ilicifolia* (holly-leaved banksia); AND
- The patch must include at least one of the following diagnostic species:
    - *Banksia attenuata* (candlestick banksia)
    - *Banksia menziesii* (firewood banksia)
    - *Banksia prionotes* (acorn banksia)
    - *Banksia ilicifolia* (holly-leaved banksia); AND
- If present, the emergent tree layer often includes *Corymbia calophylla* (marri), *E. marginata* (jarrah), or less commonly *Eucalyptus gomphocephala* (tuart); AND

- Other trees of a medium height that may be present, and may be codominant with the *Banksia* species across a patch, include *Eucalyptus todtiana* (blackbutt, pricklybark), *Nuytsia floribunda* (Western Australian Christmas tree), *Allocasuarina fraseriana* (western sheoak), *Callitris arenaria* (sandplain cypress), *Callitris pyramidalis* (swamp cypress) and *Xylomelum occidentale* (woody pear); AND
- The understorey typically contains a high to very high diversity of shrub and herb species that often vary from patch to patch. Some of the more widespread and potentially characteristic species present in the ecological community are outlined above in *Section 1 – Description*, and in descriptions of vegetation types that relate to the Banksia Woodlands (e.g. Gibson et al., 1994).

Contra-indicators:

- Patches clearly dominated by *Banksia littoralis* are not part of the Banksia Woodlands ecological community but indicates a different, dampland community is present.
- Patches clearly dominated by *Bankia burdettii* are not part of the Banksia Woodlands ecological community but indicates a tall shrubland and not the Banksia Woodlands ecological community.
- FCT 20c – Eastern shrublands and woodlands, corresponds with a separate EPBC ecological community listing, Shrublands and Woodlands of the eastern Swan Coastal Plain. Occurrences of this FCT should be considered under that separate listing.

2.2.2 Step 2: Condition thresholds

The condition threshold categories presented below describe different values and functional attributes of the ecological community and the thresholds for their inclusion in the ecological community protected under the EPBC Act. It is recognised that any single patch of a threatened ecological community may be degraded to some degree but contributes to the overall function of the ecological community (and other environmental components) across the often fragmented landscape.

Although very degraded/modified patches are not protected as the ecological community listed under the EPBC Act, it is recognised that patches that do not meet the condition thresholds may still retain important natural values and may be critical to protecting those patches that meet minimum thresholds. They may also be protected through State and local laws or schemes. Therefore, these patches should not be excluded from recovery and other management actions. Suitable recovery and management actions may improve these patches to the point that they may be regarded as part of the ecological community and become fully protected under the EPBC Act. Management actions should aim to restore patches to meet the highest quality condition thresholds outlined below, that is feasible, given circumstances and resources.

Note in particular, but also refer to *2.2.4 – Further information to assist in determining the presence of the ecological community and significant impacts*:

- Assessments of a patch should initially be centred on the area of highest native floristic diversity and/or cover, i.e. the best condition area of the patch.
- Consideration must be given to the timing of surveys and recent disturbanceIdeally surveys should be undertaken in spring with two sampling periods to capture early and late flowering species. Spring sampling is necessary as flowering is needed to accurately identify many species and active growth will indicate population sizes of ephemeral natives and weeds. Timing of surveys in recently disturbed areas should allow for a reasonable interval after the disturbance (natural or human-induced) to allow for regeneration of species to become evident, and be timed to enable component species to be identified. For example, immediately after a fire one or more vegetation layers, or groups of species (e.g. obligate seeders), may not be evident for a time.
- The surrounding context of a patch must also be taken into account when considering factors that add to the importance of a patch that meets the condition thresholds.
- Certain vegetation components of the Banksia Woodlands ecological community merit consideration as critical elements to protect. Three components are recognised as threatened in their own right in WA and, as such, are priorities for protection. They are detailed in Table 1 and in *Appendix B*.
- A relevant expert (e.g. ecological consultant, local NRM or environment agency) may be useful to help identify the ecological community and its condition.

Table 3: Condition categories and indicative measures/thresholds for assessment.
To be considered as part of the ecological community for EPBC Act referral, assessment and compliance purposes, a patch should meet at least the **Good Condition** category.

	Indicative condition measures/thresholds	
Keighery (1994) Vegetation Condition Scale (Government of WA, 2000)	**Typical native vegetation composition**	**Typical weed cover**
Pristine No obvious signs of disturbance.	Native plant species diversity fully retained or almost so[5]	Zero or almost so weed cover/abundance
Excellent Vegetation structure intact; Disturbance only affecting individual species; Weeds are non-aggressive species.	High native plant species diversity[5]	Less than 10%.
Very Good Vegetation structure altered; Obvious signs of disturbance eg: from repeated fires, dieback, logging, grazing. Aggressive weeds present	Moderate native plant species diversity[5]	5 – 20%
Good Vegetation structure altered but retains basic vegetation structure or ability to regenerate it. Obvious signs of disturbance, e.g. from partial clearing, dieback, logging, grazing. Presence of very aggressive weeds.	Low native plant species diversity[5]	5 – 50%
Degraded Basic vegetation structure severely impacted by disturbance. Requires intensive management. Disturbance evident such as partial clearing, dieback, logging and grazing Presence of very aggressive weeds at high density.	Very low native plant species diversity[5]	20 – 70%
Completely Degraded Vegetation structure is no longer intact and the area is completely or almost completely without native flora. Equivalent to 'Parkland Cleared'.	Very low to no native species diversity[5]	Greater than 70%

[5] Relative to expected natural range of diversity for that vegetation unit (e.g. Floristic Community Type), where comparative data exists.

2.2.3 Step 3: Minimum patch size

Minimum patch sizes apply for consideration of a patch as part of the listed ecological community for EPBC Act referral, assessment and compliance purposes.

Where patches meet different levels of condition, different minimum patch sizes apply:

'Pristine' – no minimum patch size applies

'Excellent' – 0.5 ha or 5,000 m^2 (e.g. 50 m x 100 m)

'Very Good' – 1 ha or 10,000 m^2 (e.g. 100 m x 100 m)

'Good' – 2 ha or 20,000 m^2 (e.g. 200 m x 100 m)

To be considered as part of the EPBC Act ecological community a patch should meet at least the **Good Condition** category – see Table 3.

Given the high proportion of smaller patches (e.g. less than 5 ha) remaining that make up the ecological community, small patches are protected in some circumstances (i.e. if they meet the minimum size thresholds specified above), particularly if they contribute to beta diversity[6] and connectivity. These smaller remnants can make significant contributions to conservation of plants and invertebrates of the ecological community, particularly in parts of the distribution where the community is very highly fragmented. This concept recognises that any single patch of a threatened ecological community may be degraded to some degree but contributes to the overall function of the ecological community (and other environmental components) across the landscape.

2.2.4 Step 4: Further information to assist in determining the presence of the ecological community and significant impacts

The following information should also be taken into consideration when applying the key diagnostic characteristics and condition thresholds (to assess a site to determine if the EPBC-protected ecological community is present and determine the potential impacts on the ecological community).

Land use history influences the state of any patch of the ecological community, while the structural form of the ecological community also affects its species richness and diversity. The landscape position of the patch, including its position relative to surrounding vegetation also influences how important it is in the broader landscape. For example, if it enables movement of native fauna or plant material or supports other ecological processes.

A **patch** is a discrete and mostly continuous area of the ecological community. A patch may include small-scale (<30 m) variations, gaps and disturbances, such as tracks, paths or breaks (including exposed soil, leaf litter, cryptogams and watercourses/drainage lines), or localised variations in vegetation that do not significantly alter the overall functionality of the

[6] **Beta diversity** here refers to the turnover of species between sites.

ecological community. Such breaks are generally included in patch size calculations. Where there is a break in native vegetation cover, from the edge of the tree canopy of 30 m or more (e.g. due to permanent artificial structures, wide roads or other barriers; or due to water bodies typically more than 30m wide) then the gap typically indicates that separate patches are present.

Variation in canopy cover, quality or condition of vegetation across a patch should not initially be considered to be evidence of multiple patches. Patches can be spatially variable and are often characterised by one or more areas within a patch that meet the key diagnostic characteristics and condition threshold criteria amongst areas of lower condition. Average canopy cover and quality across the broadest area that meets the general description of the ecological community should be used initially in determining overall canopy cover and vegetation condition. Also note any areas that are either significantly higher or lower in quality, gaps in canopy cover and the condition categories that would apply across different parts of the site respectively. Where the average canopy cover or quality falls below the minimum thresholds, the next largest area or areas that meet key diagnostics (including minimum canopy cover requirements) and minimum condition thresholds should be specified and protected. This may result in multiple patches being identified within the overall area first considered.

The Banksia Woodlands ecological community is highly diverse and variable. Composition often changes across a patch, but structure and presence of a significant Banksia component are unifying features.

A **buffer zone** is a contiguous area immediately adjacent to a patch of the ecological community that is important for protecting its integrity. The purpose of the buffer zone is to help protect and manage the national threatened ecological community. The edges of a patch are considered particularly susceptible to disturbance and the presence of a buffer zone is intended to act as a barrier to further direct disturbance.

As the area of the buffer lies to the outside, around a patch, it is not part of the ecological community and is not formally protected as a matter of national environmental significance. Where the buffer on a particular property is subject to existing land uses, such as cropping, ploughing, grazing, spraying, etc., they can continue due to ‘continuing use’ exemptions in the EPBC Act. However, practical application of a buffer zone is strongly recommended. For instance, it is recommended that care be exercised in the buffer zone to minimise the risk of any significant adverse impacts extending into those patches. Note: if the activity within the buffer zone is likely to have a significant impact on the ecological community then it would require EPBC Act approval.

The recommended minimum buffer zone for the ecological community is 20–50 metres from the outer edge of a patch, and the appropriate size depends on the nature of the buffer and local context (e.g. slope). A larger buffer zone should be applied, where practical, to protect patches that are of particularly high conservation value, or if patches are down slope of drainage lines or a source of nutrient enrichment, or groundwater drawdown.

Restored (revegetated or replanted) sites are not excluded from the listed ecological community so long as the patch meets the description, key diagnostic characteristics and condition thresholds above, and there is evidence of post-regeneration recruitment that could contribute to longer-term maintenance of the patch. It is recognised that revegetation or restoration requires appropriate techniques as well as long-term management and considerable time for a degraded patch to reach high quality condition (Stevens et al., 2016).

Sampling protocols. Thorough and representative on-ground surveys are essential to accurately assess the extent and condition of the ecological community. A minimal sampling protocol involves developing a quick/simple map of the vegetation, landscape qualities and management history (where possible) of the site. The site should then be thoroughly sampled to represent the range of variation in vegetation cover and species diversity, starting with the area of maximum apparent native plant species diversity. At least one hour per plot in early to mid spring and a second survey in late spring may be required to detect the majority of species. Sampling should be based upon plot sizes of at least 100 m^2 (= 0.01 ha, 10m x 10m, or an appropriate shape of equivalent size). However, larger and more variable areas of vegetation will need more samples or plots to assess a site accurately. Recording the search effort (identifying the number of person hours per plot and across the entire patch; along with the surveyor's level of expertise) can be useful for future reference.

Timing of surveys. Whilst identifying the ecological community and its general condition is possible at most times of the year, consideration must be given to the role that season and disturbance history may play in an assessment. For example, flowering may be necessary to identify some shrub species and active growth will indicate population sizes of annual weeds. Immediately after a fire one or more vegetation layers, or groups of species (e.g. obligate seeders), may not be evident for a time. The cover of native plants also varies between seasons and between years in response to variability in environmental conditions, and also with respect to cycles of recurring disturbance such as fire. Timing of surveys should therefore allow for a reasonable interval after a disturbance (natural or human-induced) to allow for regeneration, and be timed to enable component species to be detected and identified. For instance, surveys at least one year post fire may be required to assess a site against the key diagnostic characteristics and minimum condition thresholds.

Surrounding environment, landscape context and other significance considerations – The ecological community is dynamic and exists as a complex mosaic of species determined partly by water availability, substrate and landscape position. On top of this natural variation, a variety of anthropogenic disturbances have been imposed upon the ecological community since European settlement of the region.

Patches that are more species rich and less disturbed are likely to provide greater biodiversity value. Additionally, patches that provide corridors or linkages within a largely modified landscape are particularly important as wildlife habitat and to the viability of biota within those patches of the ecological community into the future, provided that threats are adequately managed.

Therefore, in the context of actions that may have 'significant impacts' and require approval under the EPBC Act, it is important to consider the environment surrounding patches that meet the condition thresholds. Some patches that meet the condition thresholds occur in isolation and require protection, as well as priority actions, to link them with other patches. Other patches that are interconnected with other ecological communities have additional conservation values, such as contributing to landscape complementarity, or providing movement opportunities for biota. In these instances, the following indicators should be considered when assessing the impacts of actions or proposed actions under the EPBC Act, or when considering recovery, management and funding priorities for a particular patch:

- Large size and/or a large area to boundary ratio – larger area/boundary ratios are less exposed and more resilient to edge effect disturbances such as weed invasion and human impacts;
- Evidence of recruitment of key native plant species following disturbance (including through successful assisted regeneration);
- Faunal habitat as indicated by patches that meet a diversity of habitat requirements, and that contribute to movement corridors;
- High species richness, most evident from the variety of native plant species but may also be shown by a high number of native fauna species;
- Presence of listed threatened species or key functional species such as key pollinator and dispersal animals;
- Scarcity of weeds and feral animals or opportunities to manage them efficiently;
- Absence or limited symptoms of dieback;
- Connectivity to other native vegetation remnants or restoration works (e.g. native plantings). In particular, a patch in an important position between (or linking) other patches in the landscape (taking into account that connectivity should aim to not exacerbate the incidence or spread of threats e.g. weeds);
- Linear road reserves often contain remnant native vegetation in varying levels of condition with a range of canopy and understorey species. These areas can also act as important links to larger patches of nearby vegetation. In many instances linear road reserves are the only remnant native vegetation; and,
- Occurrence of the patch is:
    - in an area where the ecological community has been most heavily cleared and degraded, so is locally or regionally at risk; or
    - of a 'sub-community'/ floristic community type that is recognised as a threatened or priority ecological community by the Western Australian Government; or
    - at the edge of the range of the ecological community.

2.3 Area critical to the survival of the ecological community

The areas considered critical to the survival of the Banksia Woodlands covers all patches that meet the key diagnostic characteristics and condition thresholds for the ecological community, plus the buffer zones, particularly where this comprises surrounding native vegetation. This is because this ecological community occurs in a landscape that has often been very heavily cleared and modified, and now exists as mostly very small and highly fragmented patches.

Note that additional areas that do not meet the minimum condition threshold may also be critical to the survival of the ecological community depending on factors such as their size and shape, landscape linkages to other patches and landscape position, because they could retain some biodiversity or habitat values, e.g. as wildlife corridors. It is important to consider the *Surrounding environment, landscape context and other significance considerations*, in *section 2.2.4*, above.

Certain vegetation components (sub-communities) of the Banksia Woodlands ecological community merit consideration as critical elements to protect. Some components are recognised as threatened in their own right in WA and, as such, are priorities for protection. They are detailed in Table 1 and *Appendix B – Detailed information on sub-communities*.

2.4 National context and other existing protection

Relationships to other EPBC-listed ecological communities

There are currently eleven nationally-listed ecological communities that occur on the Swan Coastal Plain. Most of these are distinctive from the Banksia Woodlands as they represent non-vegetation communities (e.g. thrombolites), or different vegetation strucures and assemblages (e.g claypans or *Corymbia calophylla-Kingia australis* woodlands).

The ‘Shrublands and woodlands of the eastern Swan Coastal Plain’ listed as Endangered in July 2000, coincides with one of the component Floristic Community Types / sub-communities of the Banksia Woodlands ecological community (Table 1). However, ‘Shrublands and woodlands of the eastern Swan Coastal Plain’ remains a separate EPBC ecological community listing (Department of the Environment, 2016), and occurrences of this Floristic Community Type should be considered under that separate listing.

Relationships to State-listed and priority ecological communities

The Banksia woodlands ecological community includes three ecological communities on the state’s list of Threatened Ecological Communities, which is endorsed by the Western Australian Minister for the Environment. These are (Table 1):

- ‘*Banksia attenuata* woodlands over species rich dense shrublands’ – Endangered;
- ‘*Banksia attenuata* and/or *Eucalyptus marginata* woodlands of the eastern side of the Swan Coastal Plain’ – Endangered; and
- ‘Shrublands and woodland of the eastern side of the Swan Coastal Plain’ – Critically Endangered.

The national ecological community also relates to eight Western Australian Priority Ecological Communities that are either provisionally identified as threatened or require further survey effort, as determined by the WA Threatened Ecological Communities Scientific Committee (Table 4).

Table 4. Priority ecological communities identified in Western Australia with relationships to the Banksia Woodlands ecological community.

Community Name	WA Category
Banksia ilicifolia woodlands, Southern Swan Coastal Plain (FCT 22)	P2
Swan Coastal Plain *Banksia attenuata – Banksia menziesii* woodlands (FCT 23a, 23b and/or 23c)	P3
Low lying *Banksia attenuata* woodlands or shrublands (FCT 21c)	P3
Southern *Banksia attenuata* woodlands (FCT 21b)	P3
Banksia woodland of the Gingin area restricted to soils dominated by yellow to orange sands	P2
Central Whicher Scarp Mountain Marri Woodland (WHSFCT_A1)	P1
West Whicher Scarp *Banksia attenuata* woodland (WHSFCT_B2)	P1
Whicher Scarp Jarrah woodland on deep coloured sands WHSFCT_C2)	P1

Listed threatened flora and fauna species associated with the ecological community

As at July 2016, 20 flora and 9 fauna species that are listed nationally, or listed in Western Australia, are likely to occur in the ecological community (*see Appendix A*). They include 16 nationally listed threatened plant species and 8 nationally listed threatened animal species.

Level of protection in reserves

About 81,800 hectares of the ecological community are estimated to occur within reserves across the range of the ecological community, most of which are within the Perth subregion of the Swan Coastal Plain bioregion. This represents about 24.3 percent of the estimated extent of the ecological community (Table 5).

Table 5. Extent of the Banksia Woodlands ecological community estimated to be protected in reserves.

Subregion	Current extent (ha)	Extent in reserves (ha)	% protected
Dandaragan (SWA01)	81.067.8	24,671.2	30.43
Perth (SWA02)	253,540.6	57,054.9	22.50
Jarrah Forests (JAF01/02)	1,881.4	105.9	5.63
TOTAL	**336,489.9**	**81,832.0**	**24.32**

Source: Government of Western Australia (2016).

Analysis was based upon the estimated extent of major and partially corresponding vegetation system-associations identified in Table C2 of Appendix C. Reservation was based on extent within IUCN I-IV reserves across the range of the ecological community (i.e. both subregions of the Swan Coastal Plain, plus adjacent areas of the Jarrah Forests bioregion.

3. SUMMARY OF THREATS

The main ongoing threats to the Banksia dominated woodlands ecological community are as follows:

- The greatest threat is clearing and fragmentation. This includes:
  - clearing for urban developments, especially in the Perth metropolitan region but also in the urban centres of Bunbury and Busselton;
  - associated urban degradation/disturbance such as rubbish dumping, uncontrolled vehicle access, wildflower and seed harvesting;
  - clearing for agriculture and horticulture (mainly in the past); and
  - mining for basic raw materials (e.g. road/building materials), mineral sands and silica sands, that involve vegetation clearing and hydrological impacts.
- Dieback diseases (especially those caused by *Phytophthora* species).
- Invasive species.
- Fire regime change (particularly increased fire frequency; prescribed burning during late autumn to late spring when plants are in active growth, flowering and seed development and animals are active).
- Hydrological degradation (groundwater abstraction, eutrophication, soil acidification).
- Climate change (increasing temperatures, declining rainfall, changing rainfall timing).
- Grazing (including overabundance of kangaroos particularly in peri-urban reserves).
- Decline in pollinating and seed dispersing fauna.
- Loss of keystone Banksia species and fragmenting of nectar/pollen nutritional networks e.g. loss of *Banksia ilicifolia* in water drawdown areas.

4. SUMMARY OF ELIGIBILITY FOR LISTING AGAINST EPBC ACT CRITERIA

For the detailed assessment of eligibility against the listing criteria, *see Appendix E*

The ecological community has transformed in nature from being almost continuous across much of its distribution, to now becoming very highly fragmented into numerous small and scattered patches.

There are ongoing threats to the ecological community, most notably from clearing for urban development, but also due to weed invasion, groundwater extraction, loss of fauna, dieback disease and potential impacts from climate change. These are reducing the integrity of the ecological community and its capacity for survival into the future.

Criterion 1 – Decline in geographic distribution

The Committee considers that there has been a substantial decline in geographic extent overall across the Swan Coastal Plain, in the order of 50 to 60 percent. The Committee also notes patterns of very severe regional declines, fragmentation into smaller patches, especially in the central distribution of the ecological community around the Perth metropolitan region, and recognition of separate components as threatened under State legislation. These contribute to the overall impacts of decline in extent and are consistent with a decline in geographic distribution that is **substantial**. Therefore, the ecological community has been demonstrated to have met the relevant elements of Criterion 1 to make it **eligible** for listing as **Vulnerable**.

Criterion 2 – Small geographic distribution coupled with demonstrable threat

Patch size distribution indicates the ecological community now has a highly fragmented geographic distribution with most patches (about 82%) under ten hectares in size and facing demonstrable threats. The median patch size has reduced from an estimated pre-European value of 146 ha to a current size of only 1.6 ha. The Committee considers that the heavily fragmented nature of its geographic distribution plus the nature of the threats to the ecological community over the near future indicates that the ecological community has met the relevant elements of Criterion 2 to make it **eligible** for listing as **Endangered**.

Criterion 3 – Loss or decline of functionally important species

There is insufficient information to determine the eligibility of the ecological community for listing in any category under this criterion.

Criterion 4 – Reduction in community integrity

The Banksia Woodlands exological community is subject to a number of threats across its range and the combined impacts of these threats have severely reduced the integrity of the ecological community. Furthermore the combined effects of threats have a compounding detrimental effect on the integrity of the ecological community and increase the complexity of appropriate management requirements at various scales. For example, types of the ecological community, such as those dominated by *Banksia ilicifolia* are declining at a higher

rate due to the effects of clearing, lowered water tables and *Phytophthora* disease (Stevens et al., 2016). In particular, the patterns of fragmentation, degradation and invasive species plus what is likely to be a long-term shift in water availability (the impacts of which are yet to become fully evident) indicate that community has – and will continue to – experience a serious reduction in its integrity. Given the very high diversity and complexity of this ecological community, full restoration is unlikely to be possible over a short time-frame.

The Committee considers that the available information indicates the ecological community has met the relevant elements of Criterion 4 to make it **eligible** for listing as **Endangered**.

Criterion 5 – Rate of continuing detrimental change

The available information indicates that, in the recent past and projected into the immediate future, there is considerable ongoing and planned clearing of Banksia Woodlands in the Swan Coastal Plain, especially in the region around Perth.

The guidelines for listing against this criterion require a minimum detrimental change of at least 30 percent over the immediate past, or suspected for the immediate future. The available information indicates that, despite some recent known loss of the ecological community, the degree is below the minimum indicative value. The ecological community is therefore **not eligible** for listing under any category for this criterion.

Criterion 6 – Quantitative analysis showing probability of extinction

There are no quantitative data available to assess this ecological community under this criterion. Therefore, it is **not eligible** for listing under this criterion.

5. PRIORITY RESEARCH AND CONSERVATION ACTIONS

5.1 Conservation objective

The conservation objective provides the goal and rationale for the priority actions identified here.

The conservation objective is to mitigate the risk of extinction of the Banksia Woodlands of the Swan Coastal Plain ecological community, and help recover its biodiversity and function, through:

- protecting it using the *Environment Protection and Biodiversity Conservation Act 1999*; and
- implementing priority conservation actions (as outlined in Sections 5.2 – 5.4 below).

5.2 Priority protection and restoration actions

It is more practical and cost-effective to maintain existing high quality remnants than to allow their degradation and then attempt rehabilitation of these or other areas. The more disturbed and modified a patch of the ecological community, the greater is the recovery effort required. To gain the most cost-effective outcomes of investments in management it is important to consider the likely interaction of management actions at any one site, as these may be synergistic or antagonistic. There are also likely to be interactions between sites. Additionally, when allocating resources it is important to consider the minimum investment required for success and the follow up required to secure long term recovery.

The three key approaches to achieve the conservation objective are:

PROTECT the ecological community to prevent further loss of extent and condition;

RESTORE the ecological community within its original range by active abatement of threats, re-vegetation and other conservation initiatives;

COMMUNICATE WITH AND SUPPORT researchers, land use planners, landholders, land managers, community members, including the Indigenous community, and others to increase understanding of the value and function of the ecological community and encourage their efforts in its protection and recovery.

These approaches are overlapping in practice and form part of an iterative approach to management that should include research, planning, management, monitoring and review.

Priority actions are recommended for the abatement of threats and to support recovery of the ecological community. Actions inconsistent with these recommendations that are likely to significantly affect the ecological community should not be undertaken.

In assessment of activities that may have a significant impact on the ecological community, incorporate the relevant actions listed below when determining recommendations including conditions of approval. Applications to Australian Government funding programs should also consider prioritising these restoration activities. Also take into consideration the information

outlined in *section 2.2.4 – Further information to assist in determining the presence of the ecological community and significant impacts*.

5.2.1 PROTECT

Preventing vegetation clearance and direct habitat damage

Highest priorities

- Map the boundaries, condition, and risk level to major sub-types of the ecological community. This will identify the areas in most urgent need of protection and restoration.
  - Enter mapped information into a GIS-enable database to enable identification of occurrences during environmental impact assessment and to facilitate protection and management.
  - Notify land managers of the occurrences on land that they manage to encourage compliance with legislation and management of occurrences.
- Prevent further clearance, fragmentation or detrimental modification of remnants of the ecological community and of surrounding native vegetation, for example, during residential development, basic raw materials extraction, and associated infrastructure development. High conservation value, unmodified and older growth areas are particularly important for retention and management.
  - Overall, efforts should be made to increase the remaining extent, condition and landscape scale connectivity (including with other surrounding native vegetation types).
  - Identify high quality remnants in advance of zoning and development planning decisions and avoid clearing or damaging them.
  - Recognise the landscape position of remnants of the ecological community and ensure that planning supports increased resilience within the landscape (for example, by retaining appropriate connectivity between remnants of all naturally occurring ecological communities).
  - Prevent impacts to native vegetation, native fauna, hydrology or soil structure from any developments and activities adjacent to or near patches of the ecological community by planning for and appropriately avoiding or mitigating off-site effects. For instance, apply recommended buffers of at least 20–50 m around patches of the ecological community and avoid activities that could cause significant hydrological change or eutrophication. Wider buffers may be required where there is larger scale landscape change, for example hydrological modifications.
  - Protect mature trees, particularly with hollows, even if they are dead. Large and old trees may have numerous fissures that provide shelter; support diverse insects and their predators; and act as ‘stepping stones’ for fauna moving between remnants in an otherwise cleared landscape.
  - Retain other native vegetation remnants and mature isolated trees near patches of the ecological community where they are important for connectivity.

  - Prevent firewood collection that leads to loss and damage of trees and logs.
  - Manage access to remnants to prevent, for example, disturbance and spread of plant pathogens and weeds.
  - New walking or bike tracks should be near, rather than through patches of the ecological community.
- Ensure that areas that form important landscape connections, such as wildlife corridors or other patches of particularly high quality or regional importance are considered for inclusion in formal reserve tenure or other conservation related tenure for protection and management in perpetuity.
- Liaise with local councils and State authorities to ensure that cumulative impacts, from activities undertaken as part of broader or related projects (e.g. road works, developments), are reduced when planning individual activities.
- Avoid the requirement for offsetting, by avoiding and mitigating impacts to the ecological community first. Further to 'like-for-like' principles, match offsets to the same sub-community (usually Floristic Community Type), as it is not appropriate to offset losses of one component with other components of the ecological community, given the high local endemism and β-diversity. Further information is in *Section 5.4 – Offsets*.

Other priorities

- Protect the soil seed bank by minimising soil disturbance and removal.
- Retain habitat features for fauna, noting species requirements (e.g. fallen timber, particular structure of vegetation). For example, for many bird species the quality of native vegetation as habitat can be improved by leaving fallen logs and leaf litter in situ, controlling weed species, taking care of the canopy by controlling against dieback *Phytophthora cinnamomi*, and controlling wildfires by public awareness and vigilance (Davis et al., 2013).
- Prior to removal of any trees, or use of heavy machinery that may also damage the understorey, ensure comprehensive flora and fauna surveys have identified threatened species on site and their potential shelter and nesting sites, for example hollows, burrows, rocks and tree crevices, as well as visible nests. Damage to these should be avoided altogether, but if approved for removal, care should be taken to appropriately relocate fauna.

Preventing weeds, feral animals, dieback and other diseases

Highest priorities

- Prevent weed invasion by minimising any soil disturbance.
- Do not plant (or spread) known, or potential, environmental weeds within or near the ecological community:
  - prevent activities such as planting potentially invasive species in gardens or other landscaping near the ecological community; or dumping garden waste in or near patches of the ecological community.

    - control runoff, e.g. urban runoff to prevent movement of weed material into natural areas, or elevating soil nutrients that encourage establishment of weeds over natives.

- Detect and control weeds early. Small infestations should be a priority for removal.
- Prevent further introduction of feral animals and contain domestic animals within new residential areas.
- Monitor for *Phytophthora cinnamomi* and other plant pathogens to minimise the risk of new infestations in areas that are not yet infested. Manage early for local eradication.
- Use appropriate hygiene to minimise the introduction or spread of weeds and diseases at susceptible sites. For example, keep vehicles and machinery to dedicated roads and out of remnants wherever possible. If vehicles must be taken into remnants ensure vehicles are effectively washed first to remove potential fungal pathogens and weed seeds.

Groundwater

- Manage groundwater extraction by monitoring changes to levels of groundwater over the long-term. Use the results of monitoring to ensure adverse impacts to native vegetation are minimised.

Fire

- Use a landscape-scale approach and available knowledge on fire histories and age of stands, to identify appropriate fire regimes. Fires must be managed to ensure that where possible, prevailing fire regimes do not disrupt the life cycles of the component species of the ecological community, that they support rather than degrade the habitat necessary to the ecological community, that they do not promote invasion of exotic species, and that they do not increase impacts of other disturbances such as grazing or predation by feral predators.
- Given the cycle of fires promoting grassy weed establishment and higher fuel loads, manage the fire-weed cycle by controlling invasive weed species before and after any fire events.
- In some areas of Banksia Woodlands (e.g. Gnangara Groundwater System) 8–16 years is currently recommended as an appropriate fire interval for the ecological community: however, a mosaic pattern of burning and fire ages is recommended, with retention of some long-unburnt areas (10–30 years since last fire) that provides habitat for a variety of fauna and flora (Wilson et al., 2014). Physical damage to the habitat and individuals of the threatened species must be avoided during and after fire operations.
- Implement appropriate fire management regimes for the ecological community taking into account results from research. These may include some of the following actions:
    - do not burn during reproductive seasons of threatened or functionally important or characteristic flora, and fauna species;
    - do not burn if soil moisture is very low, or relatively dry conditions are predicted for the coming season;

- where controlled burns are deemed necessary, use small scale (<1 ha) mosaic burning patterns to reduce impacts of too frequent fires on the ecological community and associated flora and fauna;
- within large patches burn different parts in rotation, rather than the whole area in any one season;
- avoid slashing or tree removal as part of fire management;
- consider fire regimes appropriate for nearby ecological communities when planning burning (for example, where wetlands are adjacent);
- monitor outcomes of fire and manage consequences (e.g. weeds and feral predators); take results into account when managing future fire regimes. (For further information on monitoring priorities see *section 5.3*).

Preventing grazing damage

- Where feral herbivores (e.g. rabbits) are present or there is an overabundance of native herbivores (e.g. kangaroos) install temporary or permanent fencing to protect regrowth, revegetation areas, or sites with threatened, regionally important or diverse understorey species.
- Manage populations of feral grazing animals that damage native vegetation.

5.2.2 RESTORE

Re-vegetation

Highest priorities

- Implement optimal regeneration, revegetation and restoration strategies for the ecological community, across the landscape. In general, use locally collected seed where available to create an appropriate canopy and diverse understorey, however, choosing sources of seed closer to the margins of their range may increase resilience to climate change.
- Site specific restoration, including consideration of the appropriate Floristic Community Type, is important to the success of restoration efforts. Complex ecosystem processes support the floristically rich woodlands in a harsh environment of infertile, low water-holding soils and hot, dry summers. Disturbances, particularly since European settlement, amplify this complexity: major past disturbances (e.g. land clearing, logging, grazing) combine with ongoing threats associated with urbanisation (e.g. fragmentation, invasive species, arson, off-road vehicles) and contemporary stressors (e.g. climate change) (Stevens et al., 2016).
- Restore wildlife corridors and linkages (where appropriate) between remnants of the ecological community and other areas of native vegetation or reconstructed habitat, to reduce fragmentation and isolation.
- Consider particularly the needs of species of conservation concern or known to be of functional importance for the ecological community, for example feed trees for Carnaby's cockatoo.

Other priorities

- Encourage appropriate use of local native species in developments and revegetation projects through local government and industry initiatives. It is important to use seeds and plants that will be resilient to future changes in climate.
- Implement effective adaptive management regimes using information from relevant research. For example, refer to best-practice guides for restoring Banksia Woodlands (Stevens et al., 2016) and the National Standards for the Practice of Ecological Restoration in Australia to assist in setting goals, planning actions and monitoring outcomes (Society for Ecological Restoration Australasia, 2015).

Control invasive species and diseases

Highest priorities

- Map weed occurrence and prioritise management of weeds in very good to pristine quality patches or where threatened or regionally significant species are known to occur.
- Implement effective control and management techniques for weeds currently affecting the ecological community, such as *Ehrharta calycina*, integrating this with alternative habitat provision and predator control.

Other priorities

- Where feasible, control introduced pest animals through consolidated landscape-scale programs.
- Manage weeds before and after fire, and during revegetation works to maximise success of restoration.
- Manage weeds at the sides of new roads and housing and industrial developments near to the ecological community by regular monitoring, and control by targeted herbicide spraying or manual removal for several years after the works are complete.
- Ensure actions to control invasive or other pest species avoid impacts on non-target species and do not have any long-term adverse impacts upon the ecological community:
    - ensure workers are appropriately trained in the use of relevant herbicides and pesticides, best methodologies (e.g. spot-spraying, stem injection) and what to target;
    - avoid chemical spray drift and off-target damage within or near to the ecological community, having regard to minimum buffer zones.

5.2.3 COMMUNICATION AND SUPPORT

Education, information and local regulation

- Develop a communication strategy, education programs, information products and signage to help local communities, planners and managers recognise:

  - when the ecological community is present and why it is important to protect it;
  - how to appropriately manage patches of the ecological community; and
  - responsibilities under state and local regulations and the EPBC Act.
- Promote knowledge about local weeds, means to control these and appropriate local native species to plant.
- Develop education programs to discourage damaging activities such as the removal of dead timber, the dumping of rubbish (particularly garden waste), creation of informal paths and the use of off-road vehicles in patches of the ecological community.
- Encourage local participation in recovery efforts, removing threats and actively restoring existing patches, as well as facilitating these. This may be achieved by setting up a recovery team(s) with appropriate expert and local participants; adoption of patches by local conservation groups; or encouraging short term involvement through field days and planting projects, with appropriate follow-up.
  - Ensure planners and participants are aware of appropriate species to plant across the range of the ecological community (taking into account local sub-communities), the best opportunities to restore landscape connectivity and encourage natural regeneration and the best known techniques for the site conditions and species being planted.
  - Ensure land managers (including pastoralists, indigenous communities, IPAs, etc) are given information about managing fire for the benefit of threatened species and ecological communities.
  - Ensure commitment to follow-up after planting, such as care of newly planted vegetation by watering, mulching, weeding and removal of tree guards.
- Promote awareness and protection of the ecological community with relevant agencies and industries. For example with:
  - state and local government planning authorities, to ensure that planning takes the protection of remnants into account, with due regard to principles for long-term conservation;
  - land developers and construction industries, to minimise threats associated with land development;
  - local councils and state authorities, to ensure road widening and maintenance activities (or other infrastructure or development activities) involving substrate or vegetation disturbance do not adversely impact the ecological community. This includes avoiding the introduction or spread of weeds and avoiding planning new roads or paths through patches of the ecological community.
- In new residential developments include measures to limit additional impacts from domestic animals and invasive plants. These may include:
  - public education, including the use of signs to both identify good examples of the ecological community and explain beneficial and detrimental activities.
  - cat exclusion areas;
  - requirements for registering and sterilising cats;

  - requirements for dogs to remain on leash in natural areas;
  - lists of suitable species for gardens to provide habitat and complement natural areas;
  - lists of invasive plant species to avoid planting in gardens.
- Liaise with local fire management authorities and agencies and engage their support in fire management of the ecological community. Request these agencies to use suitable maps and install field markers to avoid damage to the ecological community.

Incentives and support

- Support opportunities for traditional owners or other members of the Indigenous community to manage the ecological community.
- Implement formal conservation agreements (for example, covenants) for sites on private tenure that contain the ecological community.
- Develop coordinated incentive projects to encourage conservation and stewardship on private land, and link with other programs and activities, especially those managed by regional catchment councils.

5.3 Research and monitoring priorities

Relevant and well-targeted research and other information gathering activities are important in informing the protection and management of the ecological community. Coordination with individuals and groups with responsibilities for planning and on ground management is important to ensure that research questions and methods are well chosen, and that the information gathered can be applied to the benefit of the ecological community. Research and ongoing management activities can often be integrated to achieve the best results in the face of ongoing change. It is important that any monitoring is planned before management commences, considering data requirements to address research questions. Monitoring must also be resourced for at least the duration of the management activities, especially for those using a novel approach.

High priority research and monitoring activities to inform protection, management and restoration of the Banksia Woodlands of the Swan Coastal Plain ecological community include the following:

- Review data: consolidate information over entire extent of the ecological community and improve and update maps of the ecological community across its range (e.g. Swan Bioplan mapping for areas south of Perth):
  - support field survey and interpretation of other data such as aerial photographs and satellite images to more accurately document current extent, condition, threats, function, presence and use by regionally significant or threatened species.
  - support and enhance existing programs to model the pre-European extent across the entire range of the ecological community to inform restoration; identify the most intact, high conservation value remnants and gain a better understanding of variation across the ecological community.

- Identify major sub-types of the community, and map their boundaries and condition. Determine the level of risk to sub-types.
- Dieback mapping, risk assessment.
- Integrated weed management over large areas.
- Undertake or support ongoing research aimed at managing major weeds and feral animals.
- Research the effects of fire on floristics and structure of the sub-types of the community, and fauna in patches and across the broader landscape:
    - Keep precise records of fire history.
    - Monitor the response of the ecological community to fire, using an appropriate measure (species composition, populations of key species, etc) with a monitoring design that aims to improve understanding of the response to fire of the sub-types.
    - Identify and publish appropriate fire management regimes to conserve identified sub-types, key species and the broader ecological community.
- Monitor changes in condition, including response to all types of management actions and use this information to increase understanding of the ecological community and inform recommendations for future management
- Long term monitoring of groundwater decline and its impacts.
- Conduct research leading to the development of effective landscape-scale rehabilitation and maintenance of vegetation condition for the ecological community. Investigate the interactions between threats (e.g. fire regimes, climate change, *Phytophthora* dieback, hydrological changes) to determine how an integrated approach to threat management can be implemented.
- Emerging weeds and relationship with disturbance (fire, physical).
- Determine priority areas for restoration to enhance connectivity and landscape resilience.
- Investigate the most cost-effective options for restoring landscape function, including:
    - re-vegetation or assisted regeneration of priority areas, potentially buffering, connecting and protecting existing remnants.
- Weed, and predator control options such as trapping and baiting, urban containment, exclusion fencing; re-introduction of key fauna.
- Understanding plant-fungal-hydrological relationships.
- Investigate key ecological interactions, such as the role of fauna in pollination, seed dispersal and nutrient cycling. Also investigate the mechanisms of mammal decline and understanding the ecological role of mycophagous mammals; and decline of other fauna, e.g. pollinators.

- Cryptic biota and turnover.

- Legacy effects of water table decline (especially on Bassendean systems – no pH buffer capacity, water table decline results in loss of calcium, restoring water table may not restore soil chemistry).
- Further assess the vulnerability of the ecological community to climate change and investigate ways to improve resilience through other threat abatement and management actions.

Future research to optimise restoration of Banksia Woodlands (identified in Stevens et al., 2016) includes:

- alleviation of deep intractable dormancy;
- optimising broadcase seeding tehnology;
- defining genetic provenance;
- optimising plant survival;
- understanding pollination services; and
- increasing seed resources of framework *Banksia* species through native seed farming.

5.4 Offsets

Offsets are defined as measures that compensate for the residual adverse impacts of an action on the environment. Further clearance and damage to this ecological community should not occur. Therefore, offsetting is a last resort. It should only be proposed as an attempt to compensate for damage to the ecological community that is deemed unavoidable. The ecological outcomes of offsetting activities are generally uncertain: offsetting with replanted areas is insufficient as there is no guarantee that Banksia Woodlands reconstruction will be successful and, given the long ecological lags in the potential recreation of a resilient and functioning patch of the ecological community, the loss of mature banksias and other trees, for example, severely compromises the viability of the ecological community. Areas that already meet the condition thresholds are protected by this listing, so are not be used as an offset unless there is a substantial net conservation benefit such as a perpetual change in land tenure for conservation purposes, with ongoing threat abatement measures and monitoring put in place. With regard to any proposals involving offsets for this ecological community, which has been greatly reduced in spatial extent and condition, the aims are to:

- enable options to avoid the need to offset;
- retain remaining high quality patches (in good or higher condition) rather than offset;
- ensure that offsets are consistent with the wording and intent of the EPBC Act Environmental Offsets Policy (Commonwealth of Australia, 2012), including:
    - ‘like-for-like’ principles based on meeting the overall definition of the ecological community and considering the particular species composition, maturity of trees, vegetation structure and other habitat and landscape features at a particular site (e.g. do not use offsets distant from the site of impact, as there is local variation of the ecological community);

  - how proposed offsets will address key priority actions outlined in this Conservation Advice and any other relevant recovery plans, threat abatement plans and any other Commonwealth management plans;

- match offsets to the same sub-community (usually Floristic Community Type), as it is not appropriate to offset with other components of the ecological community, given the high local endemism and β-diversity;
- maintain (or increase) the overall area, quality and ecological function of the remaining extent of the ecological community and improve the formal protection of high quality areas through a combination of the following measures:
  - protecting and managing offset sites in perpetuity in areas dedicated under legislation for conservation purposes; that is, do not allow reduction in their size, condition and ecological function in the future through ongoing threat abatement measures and adaptive management based on monitoring; and/or
  - increase the area and improve ecological function of the woodlands, for example by enhancing landscape connectivity (e.g. protecting and linking smaller remnants), habitat diversity and condition; and/or
  - restoring good condition patches to meet higher condition categories (see the condition categories in the condition thresholds in Table 3), particularly to ensure that any offset sites add additional value to the remaining extent.

Restoration activities may include patches that do not meet the key diagnostics and/or condition thresholds for national protection in Table 3 but which formerly were the ecological community, have valuable landscape attributes and the likelihood of restoration to a better, more intact condition is high (hence restoration will add area to the remaining extent of the ecological community that meets the definition for EPBC Act protection in this Conservation Advice). This particular measure should not be undertaken unless in combination with one or more of the other three measures in the dot point above.

5.5 Existing plans/management prescriptions relevant to the ecological community

There is no approved state recovery plan for the ecological community, as defined in this listing. However, management prescriptions exist in the form of threat abatement plans and recovery plans relevant to the sub-communities or species that occur in it. These include:

Centre for Phytophthora Science and Management (2006). Review and Evaluation of the 2001 National Threat Abatement Plan for Dieback Caused by the Root-Rot Fungus *Phytophthora cinnamomi*. Prepared by the Centre for Phytophthora Science and Management for the Australian Government Department of the Environment and Heritage. (*Also see latest national threat abatement plan, Department of the Environment (2014), below*).

Department of Conservation and Land Management (1995).Yalgorup National Park Management Plan 1995 – 2005 No. 29.

Available on the internet at: http://www.dpaw.wa.gov.au/images/documents/parks/management-plans/decarchive/yalgorup.pdf

Department of the Environment (2014). Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi*. Department of the Environment, Canberra.

Available on the internet at: http://www.environment.gov.au/biodiversity/threatened/publications/threat-abatement-plan-disease-natural-ecosystems-caused-phytophthora-cinnamomi

Department of Environment and Conservation (2012). Parks and reserves of Yanchep and Neerabup Management Plan 2012 No. 76, Department of Environment and Conservation, Perth.

Available on the internet at: http://www.dpaw.wa.gov.au/images/documents/parks/management-plans/decarchive/20120235_yanchep_mgt_plan_2012.pdf

Department of Environment and Conservation (2010). Jandakot Regional Park Management Plan 2010.

Available on the internet at: http://www.dpaw.wa.gov.au/images/documents/parks/management-plans/decarchive/jandakot_management_plan_2010.pdf

Department of Environment and Conservation (2008). Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-Tailed Black Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan.

Available on the internet at: http://www.environment.gov.au/resource/forest-black-cockatoo-baudin%E2%80%99s-cockatoo-calyptorhynchus-baudinii-and-forest-red-tailed

Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). Threat abatement plan for competition and land degradation by rabbits.

Available on the internet at:

http://www.environment.gov.au/biodiversity/threatened/publications/tap/competition-and-land-degradation-rabbits

Department of Parks and Wildlife (2014). Swan Coastal Plain South draft management plan 2014, Department of Parks and Wildlife, Perth.

Available on the internet at:
http://www.dpaw.wa.gov.au/images/documents/parks/management-plans/Swan_Coastal_Plain_South_Draft_Management_Plan.pdf

English V and Blyth J (2000). Eastern Shrublands and Woodlands (Swan Coastal Plain Community 20c) Interim Recovery Plan 2000–2003, Department of Conservation and Land Management, Western Australia.

Available on the internet at:
http://www.environment.gov.au/resource/interim-recovery-plan-eastern-shrublands-and-woodlands-swan-coastal-community-20c-2000-2003

English V and Blyth J (2006). Shrublands and Woodlands on the Eastern side of the Swan Coastal Plain (Community type 20c) Interim Recovery Plan 2006–2011, Department of Environment and Conservation, Western Australia.
Available on the internet at:
https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/recovery_plans/Approved_interim_recovery_plans_/communities/scp20c_irp230_update.pdf

Stevens JC, Rokich DP, Newton VG, Barrett RL and Dixon KW (Eds) (2016). Restoring Perth's Banksia woodlands. UWA Publishing. Crawley, Western Australia.

5.6 Recovery plan recommendation

A Recovery Plan is not recommended at this time because the Conservation Advice sufficiently outlines the Priority Research and Conservation Actions needed for this ecological community. There are also a number of existing documents for conservation and threat abatement (e.g. Bush Forever Plan (Government of Western Australia, 2000), Restoring Perth's Banksia woodlands (Stevens et al., 2016), the Threat Abatement Plan for disease in natural ecosystems caused by *Phytophthora cinnamomi*) that support these recovery actions. Taking into account the benefits of listing the ecological community and implementation of the recovery and threat abatement priorities and actions specified in the conservation advice, a recovery plan for the ecological community is not required at this time. It is recommended that the actions in the Conservation Advice and this decision be reviewed within five years, after evaluating the effectiveness and completeness of the actions.

reference 00/EPBC-01

Commonwealth of Australia

Declaration under s178, s181, and s183 of the *Environment Protection and Biodiversity Conservation Act 1999*

I, ROBERT MURRAY HILL, Minister for the Environment and Heritage, in pursuance of s178, s181, s183 of the *Environment Protection and BiodiversityConservation Act 1999*, hereby declare that a list of threatened species, ecological communities and key threatening processes to that Act shall be deemed to be established by inclusion of the following threatened species, ecological communities and key threatening processes:

SPECIES THAT ARE ENDANGERED

Genus, species (subspecies, population)	Common Name
Animals	
Fish	
1. *Brachionichthys hirsutus*	Spotted-hand Fish
2. *Chlamydogobius micropterus*	Elizabeth Springs Goby
3. *Galaxias fontanus*	Swan Galaxias
4. *Galaxias fuscus*	Barred Galaxias
5. *Galaxias johnstoni*	Clarence Galaxias
6. *Galaxias pedderensis*	Pedder Galaxias
7. *Maccullochella ikei*	Clarence River Cod
8. *Maccullochella macquariensis*	Trout Cod
9. *Maccullochella peelii mariensis*	Mary River Cod
10. *Macquaria australasica*	Macquarie Perch
11. *Melanotaenia eachamensis*	Lake Eacham Rainbowfish
12. *Nannoperca oxleyana*	Oxleyan Pygmy Perch
13. *Scaturiginichthys vermeilipinnis*	Red-finned Blue-eye
Amphibians	
1. *Geocrinia alba*	White-bellied Frog
2. *Litoria castanea*	Yellow-spotted Tree Frog
3. *Litoria lorica*	Armoured Mistfrog
4. *Litoria nannotis*	Waterfall Frog
5. *Litoria nyakalensis*	Mountain Mistfrog
6. *Litoria rheocola*	Common Mistfrog
7. *Litoria spenceri*	Spotted Tree Frog
8. *Mixophyes fleayi*	Fleay's Frog
9. *Mixophyes iteratus*	Southern Barred Frog
10. *Nyctimystes dayi*	Lace-eyed Tree Frog
11. *Philoria frosti*	Baw Baw Frog
12. *Pseudophryne corroboree*	Southern Corroboree Frog
13. *Spicospina flammocaerulea*	Sunset Frog

14. *Taudactylus eungellensis*	Eungella Day Frog
15. *Taudactylus rheophilus*	Tinkling Frog

Reptiles

1. *Caretta caretta*	Loggerhead Turtle
2. *Egernia stokesii badia*	Western Spiny-tailed Skink
3. *Elusor lavarackorum*	Gulf Snapping Turtle
4. *Elusor macruros*	Mary River Tortoise
5. *Eulamprus leuraensis*	Blue Mountains Water Skink
6. *Eulamprus tympanum marnieae*	Corangamite Water Skink
7. *Lerista allanae*	Allan's Lerista
8. *Lepidochelys olivacea*	Pacific Ridley
9. *Pseudemydura umbrina*	Western Swamp Tortoise
10. *Tiliqua adelaidensis*	Adelaide Blue-tongue Lizard
11. *Tympanocryptis lineata pinguicolla*	Grassland Earless Dragon

Birds

1. *Acanthiza pusilla archibaldi*	Brown Thornbill (King Island subspecies)
2. *Aquila audax fleayi*	Wedge-tailed Eagle (Tasmanian subspecies)
3. *Accipiter fasciatus natalis*	Christmas Island Goshawk
4. *Calyptorhynchus banksii graptogyne*	South-eastern Red-tailed Black Cockatoo
5. *Calyptorhynchus lathami halmaturinus*	Glossy Black-Cockatoo (Kangaroo Island subspecies)
6. *Calyptorhynchus latirostris*	Carnaby's Black Cockatoo
7. *Casuarius casuarius johnsonii*	Southern Cassowary
8. *Cyanoramphus novaezelandiae cookii*	Norfolk Island Green Parrot
9. *Cyclopsitta diophthalma coxeni*	Coxen's Fig-parrot
10. *Dasyornis brachypterus*	Eastern Bristlebird
11. *Diomedea amsterdamensis*	Amsterdam Albatross
12. *Diomedea dabbenena*	Tristan Albatross
13. *Diomedea sanfordi*	Northern Royal Albatross
14. *Erythrura gouldiae*	Gouldian Finch
15. *Gallirallus philippensis andrewsi*	Buff-banded Rail (Cocos (Keeling) Island subspecies)
16. *Lathamus discolor*	Swift Parrot
17. *Lichenostomus melanops cassidix*	Helmeted Honeyeater
18. *Manorina melanotis*	Black-eared Miner
19. *Neochmia ruficauda ruficauda*	Star Finch (eastern subspecies)
20. *Neophema chrysogaster*	Orange-bellied Parrot
21. *Ninox novaeseelandiae undulata*	Norfolk Island Boobook Owl
22. *Pardalotus quadragintus*	Forty-spotted Pardalote
23. *Pezoporus occidentalis*	Night Parrot
24. *Pezoporus wallicus flaviventris*	Western Ground Parrot
25. *Psephotus chrysopterygius*	Golden-shouldered Parrot
26. *Psophodes nigrogularis nigrogularis*	Western Whipbird (western heath subspecies)
27. *Pterodroma leucoptera leucoptera*	Gould's Petrel
28. *Sterna vittata bethunei*	Antarctic Tern (New Zealand subspecies)
29. *Stipiturus malachurus intermedius*	Mount Lofty Southern Emu-wren
30. *Sula abbotti*	Abbott's Booby
31. *Thalassarche eremita*	Chatham Albatross
32. *Turnex olivei*	Buff-breasted Button-quail
33. *Xanthomyza phrygia*	Regent Honeyeater

Mammals

1. *Balaenoptera musculus*	Blue Whale
2. *Bettongia tropica*	Northern Bettong
3. *Burramys parvus*	Mountain Pygmy-possum
4. *Crocidura attenuata trichura*	Christmas Island Shrew
5. *Dasycercus hillieri*	Ampurta
6. *Dasyurus maculatus gracilis*	Spotted-tailed Quoll or Yarri (North Queensland subspecies)
7. *Eubalaena australis*	Southern Right Whale
8. *Gymnobelideus leadbeateri*	Leadbeater's Possum
9. *Lagorchestes hirsutus* unnamed subsp.	Mala or Rufous Hare-wallaby
10. *Lasiorhinus krefftii*	Northern Hairy-nosed Wombat
11. *Melomys rubicola*	Bramble Cay Melomys
12. *Notoryctes caurinus*	Karkarratul (Northern Marsupial Mole)
13. *Notoryctes typhlops*	Yitjarritjarri (Southern Marsupial Mole)
14. *Onychogalea fraenata*	Bridled Nailtail Wallaby
15. *Parantechinus apicalis*	Dibbler
16. *Perameles bougainville bougainville*	Western Barred Bandicoot (Shark Bay)
17. *Perameles gunnii* unnamed subsp.	Eastern Barred Bandicood (mainland)
18. *Petaurus gracilis*	Mahogany Glider
19. *Petrogale persephone*	Proserpine Rock-wallaby
20. *Phascogale calura*	Red-tailed Phascogale
21. *Potorous longipes*	Long-footed Potoroo
22. *Potorous gilbertii*	Gilbert's Potoroo
23. *Pseudomys fumeus*	Konoom or Smoky Mouse
24. *Pseudomys oralis*	Hastings River Mouse
25. *Sminthopsis aitkeni*	Kangaroo Island Dunnart
26. *Sminthopsis douglasi*	Julia Creek Dunnart
27. *Sminthopsis psammophila*	Sandhill Dunnart
28. *Zyzomys palatalis*	Carpentarian Rock-rat
29. *Zyzomys pedunculatus*	Central Rock-rat

Non-Vascular Plant

Lychnothamnus barbatus

Plants

1. *Acacia aprica Chapman & Maslin ms*
2. *Acacia aristulata Maslin ms.*
3. *Acacia ataxiphylla subsp. magna Maslin ms*
4. *Acacia auratiflora*
5. *Acacia brachypoda*
6. *Acacia cochlocarpa subsp. cochlocarpa*
7. *Acacia cretacea*
8. *Acacia enterocarpa*
9. *Acacia gordonii*
10. *Acacia insolita subsp. recurva Maslin ms.*
11. *Acacia lanuginophylla*
12. *Acacia leptalea Maslin ms.*
13. *Acacia lobulata*
14. *Acacia pharangites*
15. *Acacia pinguifolia*
16. *Acacia porcata*
17. *Acacia pygmaea*

18. *Acacia recurvata R.Cowan & Maslin ms*
19. *Acacia rhamphophylla Maslin ms*
20. *Acacia ruppii*
21. *Acacia sciophanes*
22. *Acacia sp. Dandaragan (S.van Leeuwen 269)*
23. *Acacia subflexuosa subsp. capillata R.S.Cowan & Maslin ms*
24. *Acacia terminalis subsp. terminalis*
25. *Acacia vassalii*
26. *Acacia volubilis*
27. *Acacia whibleyana*
28. *Acronychia littoralis*
29. *Adenanthos cunninghamii*
30. *Adenanthos dobagii*
31. *Adenanthos eyrei*
32. *Adenanthos pungens subsp. effusus*
33. *Adenanthos velutinus*
34. *Agrostis adamsonii*
35. *Agrostis limitanea*
36. *Alectryon ramiflorus*
37. *Allocasuarina defungens*
38. *Allocasuarina emuina*
39. *Allocasuarina glareicola*
40. *Allocasuarina portuensis*
41. *Allocasuarina thalassoscopica*
42. *Amyema scandens*
43. *Andersonia axilliflora*
44. *Andersonia gracilis*
45. *Anigozanthos bicolor subsp. minor*
46. *Apatophyllum constablei*
47. *Aponogeton bullosus*
48. *Aponogeton sp.Innisfail (Innisfail live-bearing)*
49. *Archontophoenix myolensis*
50. *Argentipallium spiceri*
51. *Aristida granitica*
52. *Arthrochilus huntianus subsp. nothofagicola*
53. *Asterolasia elegans*
54. *Astrotricha roddii*
55. *Atalaya collina*
56. *Austromyrtus fragrantissima*
57. *Austromyrtus gonoclada*
58. *Baeckea kandos*
59. *Ballantinia antipoda*
60. *Banksia brownii*
61. *Banksia cuneata*
62. *Banksia oligantha*
63. *Barbarea australis*
64. *Bentleya spinescens*
65. *Bertya ingramii*
66. *Bertya sp.Berron Holding (P.I.Forster 5753)*
67. *Beyeria lepidopetala*
68. *Billardiera mollis*

69. *Boronia capitata subsp. capitata*
70. *Boronia exilis*
71. *Boronia granitica*
72. *Boronia repanda*
73. *Boronia revoluta*
74. *Borya mirabilis*
75. *Brachyscome muelleri*
76. *Brachysema papilio*
77. *Burmannia sp.Melville Island (R.Fensham 1021)*
78. *Cajanus mareebensis*
79. *Caladenia amoena*
80. *Caladenia anthracina*
81. *Caladenia arenaria*
82. *Caladenia argocalla*
83. *Caladenia atroclavia*
84. *Caladenia audasii*
85. *Caladenia behrii*
86. *Caladenia bryceana subsp. bryceana*
87. *Caladenia busselliana Hopper & A.P. Brown ms.*
88. *Caladenia caesarea subsp. maritima*
89. *Caladenia campbellii*
90. *Caladenia carnea var. subulata*
91. *Caladenia colorata*
92. *Caladenia dienema*
93. *Caladenia dorrienii*
94. *Caladenia elegans Hopper & A.P. Brown ms.*
95. *Caladenia excelsa Hopper & A.P.Brown ms*
96. *Caladenia fragrantissima subsp. orientalis*
97. *Caladenia fulva*
98. *Caladenia gladiolata*
99. *Caladenia hastata*
100. *Caladenia hoffmanii Hopper & A.P.Brown ms*
101. *Caladenia huegelii Hopper & A.P. Brown ms*
102. *Caladenia lindleyana*
103. *Caladenia lowanensis*
104. *Caladenia macroclavia*
105. *Caladenia pallida*
106. *Caladenia richardsiorum*
107. *Caladenia rigida*
108. *Caladenia robinsonii*
109. *Caladenia rosella*
110. *Caladenia saggicola*
111. *Caladenia sylvicola*
112. *Caladenia tensa*
113. *Caladenia thysanochila*
114. *Caladenia tonelli*
115. *Caladenia viridescens Hopper & A.P. Brown ms.*
116. *Caladenia winfieldii Hopper & A.P.Brown ms.*
117. *Caladenia xanthochila*
118. *Caladenia xantholeuca*
119. *Callitris oblonga subsp. oblonga*
120. *Calochilus psednus*

121. *Calochilus richae*
122. *Calotis moorei*
123. *Calytrix breviseta subsp. breviseta*
124. *Carronia pedicellata*
125. *Centrolepis caespitosa*
126. *Chamelaucium sp. Gingin (N.G.Marchant s.n., 4/11/1988)*
127. *Chingia australis*
128. *Chordifex abortivus L.A.S Johnson & Briggs ms.*
129. *Chorizema humile*
130. *Chorizema varium*
131. *Conospermum densiflorum subsp. unicephalatum*
132. *Conospermum toddii*
133. *Conostylis dielsii subsp. teres*
134. *Conostylis drummondii*
135. *Conostylis lepidospermoides*
136. *Conostylis micrantha*
137. *Conostylis misera*
138. *Conostylis seorsiflora subsp. trichophylla*
139. *Conostylis setigera subsp. dasys*
140. *Conostylis wonganensis*
141. *Coopernookia georgei*
142. *Corchorus cunninghamii*
143. *Correa lawrenceana var. genoensis*
144. *Corybas sp. Finniss (R.Bates 28794)*
145. *Cossinia australiana*
146. *Crepidium lawleri*
147. *Cullen parvum*
148. *Cyathea exilis*
149. *Cycas megacarpa*
150. *Cycas ophiolitica*
151. *Cynanchum elegans*
152. *Cyperus cephalotes*
153. *Cyphanthera odgersii subsp. occidentalis*
154. *Danthonia popinensis*
155. *Daphnandra sp.Illawarra (R.Schodde 3475)*
156. *Darwinia acerosa*
157. *Darwinia apiculata*
158. *Darwinia carnea*
159. *Darwinia chapmaniana Marchant & Keighery ms*
160. *Darwinia collina*
161. *Darwinia ferricola N.G.Marchant & Keighery ms*
162. *Darwinia oxylepis*
163. *Darwinia sp.Carnamah (J.Coleby Williams 148)*
164. *Darwinia sp.Williamson (G.J.Keighery 12717)*
165. *Darwinia wittwerorum*
166. *Davidsonia pruriens var. jerseyana*
167. *Davidsonia sp. Mullumbimby-Currumbin Ck (A.G. Floyd 1595)*
168. *Daviesia bursarioides*
169. *Daviesia cunderdin Crisp & G.Chandler ms*
170. *Daviesia euphorbioides*

171. *Daviesia megacalyx*
172. *Daviesia microcarpa*
173. *Daviesia pseudaphylla*
174. *Daviesia speciosa*
175. *Decaspermum sp.Mt Morgan (D.Hoy 71)*
176. *Dendrobium antennatum*
177. *Dendrobium lithocola*
178. *Dendrobium mirbelianum*
179. *Dendrobium nindii*
180. *Deyeuxia appressa*
181. *Deyeuxia drummondii*
182. *Dianella amoena*
183. *Digitaria porrecta*
184. *Diospyros mabacea*
185. *Diplazium pallidum*
186. *Diploglottis campbellii*
187. *Dipodium pictum*
188. *Diuris basaltica D.L. Jones ined.*
189. *Diuris fragrantissima*
190. *Diuris lanceolata*
191. *Diuris pedunculata*
192. *Dodonaea subglandulifera*
193. *Drakaea confluens Hopper & A.P.Brown ms Diuris purdiei*
194. *Drakaea elastica*
195. *Drakaea isolata Hopper & A.P.Brown ms.*
196. *Drakonorchis drakeoides Hopper & A.P. Brown ms.*
197. *Drummondita ericoides*
198. *Dryandra anatona*
199. *Dryandra aurantia*
200. *Dryandra ionthocarpa*
201. *Dryandra mimica*
202. *Dryandra montana*
203. *Dryandra nivea subsp. uliginosa*
204. *Elaeocarpus sp.Rocky Creek (G.Read AQ 562114)*
205. *Elaeocarpus williamsianus*
206. *Endiandra cooperana*
207. *Endiandra floydii*
208. *Epacris acuminata*
209. *Epacris apsleyensis*
210. *Epacris barbata*
211. *Epacris exserta*
212. *Epacris glabella*
213. *Epacris grandis*
214. *Epacris hamiltonii*
215. *Epacris stuartii*
216. *Epacris virgata sensu stricto 'Beaconsfield'*
217. *Epiblema grandiflorum var. cyanea K. Dixon ms.*
218. *Eremochloa muricata*
219. *Eremophila denticulata subsp. trisulcata Chinnock ms*
220. *Eremophila lactea*

221. *Eremophila nivea*
222. *Eremophila pinnatifida Chinnock ms*
223. *Eremophila resinosa*
224. *Eremophila scaberula*
225. *Eremophila subteretifolia Chinnock ms.*
226. *Eremophila ternifolia*
227. *Eremophila veneta Chinnock m.s.*
228. *Eremophila verticillata*
229. *Eremophila virens*
230. *Eremophila viscida*
231. *Eriocaulon australasicum*
232. *Eriocaulon carsonii*
233. *Eryngium fontanum*
234. *Eucalyptus absita*
235. *Eucalyptus balanites*
236. *Eucalyptus beardiana*
237. *Eucalyptus bennettiae*
238. *Eucalyptus brevipes*
239. *Eucalyptus burdettiana*
240. *Eucalyptus conglomerata*
241. *Eucalyptus copulans*
242. *Eucalyptus crenulata*
243. *Eucalyptus crucis subsp. praecipua*
244. *Eucalyptus cuprea*
245. *Eucalyptus dolorosa*
246. *Eucalyptus graniticola Brooker & Hopper ms*
247. *Eucalyptus imlayensis*
248. *Eucalyptus impensa*
249. *Eucalyptus insularis*
250. *Eucalyptus leprophloia*
251. *Eucalyptus morrisbyi*
252. *Eucalyptus pachycalyx subsp. banyabba*
253. *Eucalyptus phylacis*
254. *Eucalyptus pruiniramis*
255. *Eucalyptus recurva*
256. *Eucalyptus rhodantha var. petiolaris*
257. *Eucalyptus sp. Howes Swamp Creek (M.Doherty, 19/7/1985, NSW 207054)*
258. *Euphrasia collina subsp. muelleri*
259. *Euphrasia collina subsp. osbornii*
260. *Euphrasia fabula W.C.Potts and W.R.Barker ms*
261. *Euphrasia fragosa*
262. *Euphrasia gibbsiae subsp. psilantherea*
263. *Euphrasia semipicta*
264. *Fimbristylis adjuncta*
265. *Fontainea oraria*
266. *Frankenia plicata*
267. *Gardenia actinocarpa*
268. *Gastrolobium glaucum*
269. *Gastrolobium graniticum*
270. *Gastrolobium hamulosum*
271. *Genoplesium brachystachyum*

272. *Genoplesium firthii*
273. *Genoplesium plumosum*
274. *Genoplesium rhyoliticum*
275. *Genoplesium tectum*
276. *Genoplesium vernalis D.L.Jones ms.*
277. *Gentiana baeuerlenii*
278. *Gentiana wingecarribiensis*
279. *Gingidia montana*
280. *Glyceria drummondii*
281. *Graptophyllum reticulatum*
282. *Grevillea acanthifolia subsp. paludosa*
283. *Grevillea althoferorum*
284. *Grevillea batrachioides*
285. *Grevillea beadleana*
286. *Grevillea caleyi*
287. *Grevillea calliantha*
288. *Grevillea christineae*
289. *Grevillea curviloba subsp. curviloba*
290. *Grevillea curviloba subsp. incurva*
291. *Grevillea dryandroides subsp. dryandroides*
292. *Grevillea dryandroides subsp. hirsuta*
293. *Grevillea guthrieana*
294. *Grevillea humifusa P.Olde & N.Marriott ms.*
295. *Grevillea iaspicula*
296. *Grevillea infundibularis*
297. *Grevillea involucrata*
298. *Grevillea maccutcheonii Keighery & Cranfield ms.*
299. *Grevillea masonii*
300. *Grevillea maxwellii*
301. *Grevillea mollis*
302. *Grevillea molyneuxii*
303. *Grevillea murex*
304. *Grevillea obtusiflora*
305. *Grevillea pythara*
306. *Grevillea rara*
307. *Grevillea rivularis*
308. *Grevillea scapigera*
309. *Grevillea wilkinsonii*
310. *Grevillea williamsonii*
311. *Habenaria macraithii*
312. *Hakea pulvinifera*
313. *Hakea sp. Kowmung River (M.Doherty 17-24)*
314. *Haloragis eyreana*
315. *Haloragodendron lucasii*
316. *Hemiandra gardneri*
317. *Hemiandra rutilans*
318. *Hemiandra sp. Watheroo (S.Hancocks 4)*
319. *Huperzia carinata*
320. *Huperzia dalhousieana*
321. *Huperzia filiformis*
322. *Huperzia squarrosa*
323. *Hydatella dioica*

324. Hypocalymma longifolium
325. Indigofera efoliata
326. Irenepharsus trypherus
327. Isoglossa eranthemoides
328. Isopogon uncinatus
329. Jacksonia pungens J.Chappill ms
330. Jacksonia quairading J.Chappill ms.
331. Jacksonia sp. Collie (C.J.Koch 177)
332. Kennedia macrophylla
333. Lambertia echinata subsp. echinata
334. Lambertia echinata subsp. occidentalis
335. Lambertia fairallii
336. Lambertia orbifolia
337. Lasiopetalum pterocarpum E.M.Benn. & K.Shepherd ms
338. Lasiopetalum rotundifolium
339. Lechenaultia laricina
340. Lechenaultia pulvinaris
341. Leionema equestre
342. Leionema lachnaeoides
343. Lepidium hyssopifolium
344. Lepidium monoplocoides
345. Lepidosperma rostratum
346. Leucochrysum albicans var. tricolor
347. Leucopogon confertus
348. Leucopogon gnaphalioides
349. Leucopogon marginatus
350. Leucopogon obtectus
351. Leucopogon sp. Coolmunda D.Halford Q 1635
352. Lomatia tasmanica
353. Macadamia jansenii
354. Macarthuria keigheryi
355. Macrozamia cranei
356. Macrozamia lomandroides
357. Macrozamia pauli-guilielmi
358. Macrozamia platyrhachis
359. Melaleuca sciotostyla
360. Melichrus hirsutus J.B.Williams ms.
361. Melichrus sp. Gibberagee (A.S.Benwell & J.B.Williams 97239)
362. Microcarpaea agonis
363. Micromyrtus grandis
364. Microstrobos fitzgeraldii
365. Microtis angusii
366. Muehlenbeckia tuggeranong
367. Mukia sp. Longreach (D.Davidson AQ279935)
368. Myoporum turbinatum
369. Myriophyllum lapidicola
370. Ochrosia moorei
371. Olearia flocktoniae
372. Olearia hygrophila
373. Olearia microdisca

374. *Orthrosanthus muelleri*
375. *Pandanus spiralis var. flammeus*
376. *Paracaleana dixonii Hopper & A.P.Brown ms*
377. *Parsonsia dorrigoensis J.B.Williams ms.*
378. *Patersonia spirafolia*
379. *Persoonia hirsuta*
380. *Persoonia micranthera*
381. *Persoonia mollis subsp. maxima*
382. *Persoonia nutans*
383. *Petrophile latericola Keighery ms.*
384. *Phaius australis*
385. *Phaius bernaysii*
386. *Phaius tankarvilleae*
387. *Phalaenopsis rosenstromii*
388. *Phebalium daviesii*
389. *Philotheca basistyla*
390. *Philotheca wonganensis*
391. *Pimelea spicata*
392. *Pimelea venosa*
393. *Pityrodia scabra*
394. *Plectranthus habrophyllus*
395. *Plectranthus nitidus*
396. *Plectranthus omissus*
397. *Plectranthus torrenticola*
398. *Plesioneuron tuberculatum*
399. *Pomaderris cotoneaster*
400. *Pouteria eerwah*
401. *Prasophyllum affine*
402. *Prasophyllum amoenum*
403. *Prasophyllum apoxychilum*
404. *Prasophyllum castaneum*
405. *Prasophyllum correctum*
406. *Prasophyllum diversiflorum*
407. *Prasophyllum favonium*
408. *Prasophyllum frenchii*
409. *Prasophyllum milfordense*
410. *Prasophyllum olidum*
411. *Prasophyllum perangustum*
412. *Prasophyllum petilum*
413. *Prasophyllum pulchellum D.L.Jones ms*
414. *Prasophyllum secutum*
415. *Prasophyllum stellatum*
416. *Prasophyllum suaveolens*
417. *Prasophyllum subbisectum*
418. *Prasophyllum tunbridgense*
419. *Prasophyllum uroglossum*
420. *Prostanthera askania*
421. *Prostanthera eurybioides*
422. *Prostanthera junonis*
423. *Pterostylis aenigma*
424. *Pterostylis atriola*
425. *Pterostylis basaltica*

426. *Pterostylis commutata*
427. *Pterostylis despectans*
428. *Pterostylis gibbosa*
429. *Pterostylis rubenachii*
430. *Pterostylis saxicola*
431. *Pterostylis sp. Botany Bay (A.Bishop J221/1-13)*
432. *Pterostylis sp. Halbury (R.Bates 8425)*
433. *Pterostylis sp. Hale (R.Bates 21725)*
434. *Pterostylis sp. Northampton (S.D. Hopper 3349)*
435. *Pterostylis wapstreorum*
436. *Pterostylis ziegeleri*
437. *Ptychosperma bleeseri*
438. *Pultenaea parrisiae subsp. elusa*
439. *Pultenaea selaginoides*
440. *Quassia sp. Mooney Creek (J. King s.n. 1949)*
441. *Randia moorei*
442. *Ranunculus prasinus*
443. *Rapanea sp. Richmond River (J.H.Maiden & J.Boorman NSW 26751)*
444. *Rhizanthella gardneri*
445. *Ricinocarpos trichophorus*
446. *Roycea pycnophylloides*
447. *Rulingia prostrata*
448. *Rulingia sp. Trigwell Bridge (R.Smith s.n., 20/6/1989)*
449. *Rutidosis leptorrhynchoides*
450. *Sagina diemensis*
451. *Sankowskya stipularis*
452. *Sclerolaena napiformis*
453. *Senecio behrianus*
454. *Sphenotoma drummondii*
455. *Spirogardnera rubescens*
456. *Spyridium microphyllum*
457. *Spyridium sp. (Little Desert)*
458. *Stemodia haegii W.R.Barker ms.*
459. *Stenanthemum pimeleoides*
460. *Stipa wakoolica*
461. *Stylidium coroniforme*
462. *Swainsona recta*
463. *Symonanthus bancroftii*
464. *Synaphea quartzitica*
465. *Tectaria devexa*
466. *Tetratheca deltoidea*
467. *Tetratheca gunnii*
468. *Tetratheca paynterae*
469. *Thelymitra epipactoides*
470. *Thelymitra manginii K.Dixon & Batty ms*
471. *Thelymitra stellata*
472. *Thomasia sp. Green Hill (S.Paust 1322)*
473. *Toechima pterocarpum*
474. *Trachymene saniculifolia*
475. *Triplarina imbricata*

476. *Triplarina nowraensis*
477. *Triunia robusta*
478. *Tylophora linearis*
479. *Tylophora rupicola*
480. *Tylophora woollsii*
481. *Uromyrtus australis*
482. *Verticordia albida*
483. *Verticordia densiflora var. pedunculata*
484. *Verticordia fimbrilepis subsp. fimbrilepis*
485. *Verticordia harveyi*
486. *Verticordia hughanii*
487. *Verticordia pityrhops*
488. *Verticordia plumosa var. ananeotes*
489. *Verticordia plumosa var. pleiobotrya*
490. *Verticordia plumosa var. vassensis*
491. *Verticordia spicata subsp. squamosa*
492. *Verticordia staminosa subsp. cylindracea varn. cylidracea*
493. *Verticordia staminosa subsp. staminosa*
494. *Villarsia calthifolia*
495. *Vrydagzynea paludosa*
496. *Westringia crassifolia*
497. *Westringia kydrensis*
498. *Wollemia nobilis*
499. *Wurmbea calcicola*
500. *Wurmbea tubulosa*
501. *Xanthorrhoea bracteata*
502. *Xanthostemon formosus*
503. *Xerothamnella herbacea*
504. *Zieria adenophora*
505. *Zieria baeuerlenii J.A. Armstrong ms.*
506. *Zieria buxijugum J. Briggs & J.A. Armstrong ms.*
507. *Zieria covenyi J.A.Armstrong ms.*
508. *Zieria floydii J.A.Armstrong ms.*
509. *Zieria formosa J. Briggs & J.A. Armstrong ms.*
510. *Zieria granulata*
511. *Zieria ingramii J.A.Armstrong ms.*
512. *Zieria lasiocaulis J.A.Armstrong ms.*
513. *Zieria obcordata*
514. *Zieria parrisiae J. Briggs & J.A. Armstrong ms.*
515. *Zieria prostrata J.A. Armstrong ms.*
516. *Zieria sp. Brolga Park (A.R.Bean 1002)*

SPECIES THAT ARE VULNERABLE

Genus, species (subspecies, population)	**Common Name**
Animals	
Annelid Worm	
Megascolides australis	Giant Gippsland Earthworm

Crustaceans

1.	*Astacopsis gouldi*	Tasmanian Giant Freshwater Crayfish
2.	*Lasionectes exleyi*	

Insects

	Paralucia spinifera	Bathurst Copper Butterfly

Fish

1.	*Carcharodon carcharias*	Great White Shark
2.	*Carcharias taurus*	Grey Nurse Shark
3.	*Chlamydogobius squamigenus*	Edgbaston Goby
4.	*Craterocephalus fluviatilis*	Murray Hardyhead
5.	*Galaxias tanycephalus*	Saddled Galaxias
6.	*Galaxiella pusilla*	Dwarf Galaxias
7.	*Glyphis sp A (cf Glyphis glyphis)*	Speartooth Shark
8.	*Milyeringa veritas*	Blind Gudgeon
9.	*Mogurnda n.* sp.	Flinders Range Gudgeon
10.	*Nannoperca obscura*	Yarra Pygmy Perch
11.	*Nannoperca variegata*	Ewens Pygmy Perch
12.	*Ophisternon candidum*	Blind Cave Eel
13.	*Pristis microdon*	Freshwater Sawfish
14.	*Prototroctes maraena*	Australian Grayling
15.	*Pseudomugil mellis*	Honey Blue-eye
16.	*Sympterichthys* sp. [CSIRO #T6.01]	Ziebell's Handfish
17.	*Sympterichthys* sp. [CSIRO #T1996.01]	Waterfall Bay Handfish

Amphibians

1.	*Geocrinia vitellina*	Orange-bellied Frog
2.	*Heleioporus australiacus*	Giant Burrowing Frog
3.	*Litoria aurea*	Green and Golden Bell Frog
4.	*Litoria littlejohni*	Littlejohn's Tree Frog
5.	*Litoria olongburensis*	Wallum Sedge Frog
6.	*Litoria piperata*	Peppered Tree Frog
7.	*Litoria raniformis*	Southern Bell Frog
8.	*Litoria verreauxii alpina*	Alpine Tree Frog
9.	*Mixophyes balbus*	Stuttering Frog
10.	*Pseudophryne covacevichae*	Magnificent Brood Frog
11.	*Pseudophryne pengilleyi*	Northern Corroboree Frog
12.	*Taudactylus pleione*	Kroombit Tinker Frog

Reptiles

1.	*Anomalopus mackayi*	Long-legged Worm-skink
2.	*Aprasia parapulchella*	Pink-tailed Worm-lizard
3.	*Aprasia pseudopulchella*	Flinders Ranges Worm-lizard
4.	*Aprasia rostrata rostrata*	Hermite Island Worm-lizard
5.	*Chelonia mydas*	Green Turtle
6.	*Christinus guentheri*	Lord Howe Island Gecko
7.	*Coeranoscincus reticulatus*	Three-toed Snake-tooth Skink
8.	*Ctenophorus yinnietharra*	Yinnietharra Rock-dragon
9.	*Ctenotus angusticeps*	Airlie Island Ctenotus
10.	*Ctenotus lancelini*	Lancelin Island Skink
11.	*Ctenotus zastictus*	Hamelin Ctenotus
12.	*Delma impar*	Striped Legless Lizard
13.	*Delma labialis*	Striped-tailed Delma
14.	*Delma mitella*	Legless Lizard
15.	*Delma torquata*	Collared Delma

16. *Denisonia maculata* — Ornamental Snake
17. *Dermochelys coriacea* — Leathery Turtle
18. *Egernia kintorei* — Great Desert Skink
19. *Egernia rugosa* — Yakka Skink
20. *Egernia stokesii aethiops* — Baudin Island Spiny-tailed Skink
21. *Elseya* sp. nov. (AMS-R140984) — Namoi River Elseya (Namoi River, NSW)
22. *Emydura signata* — Bellinger River Emydura (Bellinger River, NSW)
23. *Eretmochelys imbricata* — Hawksbill Turtle
24. *Furina dunmalli* — Dunmall's Snake
25. *Hoplocephalus bungaroides* — Broad-headed Snake
26. *Lepidodactylus listeri* — Christmas Island Gecko
27. *Lerista vittata* — Mount Cooper Striped Lerista
28. *Morelia olivacea barroni* — Olive Python (Pilbara subspecies)
29. *Natator depressus* — Flatback Turtle
30. *Nephrurus deleani* — Pernatty Knob-tail
31. *Niveoscincus palfreymani* — Pedra Branca Skink
32. *Notechis ater ater* — Krefft's Tiger Snake (Flinders Ranges, SA)
33. *Ophidiocephalus taeniatus* — Bronzeback Snake-lizard
34. *Paradelma orientalis* — Brigalow Scaly-foot
35. *Pseudemoia lichenigera* — Lord Howe Island Skink
36. *Ramphotyphlops exocoeti* — Christmas Island Blind Snake
37. *Rheodytes leukops* — Fitzroy Tortoise
38. *Underwoodisaurus sphyrurus* — Border Thick-tailed Gecko

Birds

1. *Acanthiza iredalei iredalei* — Slender-billed Thornbill (western subspecies)
2. *Amytornis textilis modestus* — Thick-billed Grasswren (eastern subspecies)
3. *Amytornis textilis myall* — Thick-billed Grasswren (Gawler Ranges subspecies)
4. *Amytornis textilis textilis* — Thick-billed Grasswren (western subspecies)
5. *Anous tenuirostris melanops* — Lesser Noddy
6. *Atrichornis clamosus* — Noisy Scrub-bird
7. *Cacatua pastinator pastinator* — Western Long-billed Corella (southern subspecies)
8. *Calyptorhynchus baudinii* — Baudin's Black Cockatoo
9. *Cereopsis novaehollandiae grisea* — Recherche Cape Barren Goose
10. *Dasyornis longirostris* — Western Bristlebird
11. *Diomedea antipodensis* — Antipodean Albatross
12. *Diomedea epomophora* — Southern Royal Albatross
13. *Diomedea exulans* — Wandering Albatross
14. *Diomedea gibsoni* — Gibson's Albatross
15. *Erythrotriorchis radiatus* — Red Goshawk
16. *Falcunculus frontatus whitei* — Crested Shrike-tit (northern subspecies)
17. *Fregata andrewsi* — Christmas Island Frigatebird
18. *Fregetta grallaria grallaria* — White-bellied Storm-petrel (Australasian subspecies)
19. *Geophaps scripta scripta* — Squatter Pigeon (southern subspecies)
20. *Geophaps smithii blaauwi* — Partridge Pigeon (western subspecies)
21. *Geophaps smithii smithii* — Partridge Pigeon (eastern subspecies)
22. *Halobaena caerulea* — Blue Petrel
23. *Leipoa ocellata* — Malleefowl
24. *Malurus coronatus coronatus* — Purple-crowned Fairy-wren (western subspecies)
25. *Malurus leucopterus edouardi* — Barrow Island Black-and-white Fairy-wren
26. *Malurus leucopterus leucopterus* — Dirk Hartog Black-and-white Fairy-wren
27. *Neochmia phaeton evangelinae* — Crimson Finch (white-bellied subspecies)
28. *Ninox natalis* — Christmas Island Hawk-owl
29. *Pachycephala pectoralis xanthoprocta* — Golden Whistler (Norfolk Island subspecies)
30. *Pachycephala rufogularis* — Red-lored Whistler
31. *Pachyptila turtur subantarctica* — Fairy Prion (southern subspecies)

32. *Pedionomus torquatus* — Plains-wanderer
33. *Petroica multicolor multicolor* — Scarlet Robin (Norfolk Island subspecies)
34. *Psophodes nigrogularis oberon* — Western Whipbird (western mallee subspecies)
35. *Phalacrocorax nivalis* — Heard Shag
36. *Phalacrocorax purpurascens* — Macquarie Shag
37. *Phoebetria fusca* — Sooty Albatross
38. *Poephila cincta cincta* — Black-throated Finch (southern subspecies)
39. *Polytelis alexandrae* — Alexandra's Parrot
40. *Polytelis anthopeplus anthopeplus* — Regent Parrot (eastern subspecies)
41. *Polytelis swainsonii* — Superb Parrot
42. *Psophodes nigrogularis leucogaster* — Western Whipbird (eastern subspecies)
43. *Pterodroma mollis* — Soft-plumaged Petrel
44. *Pterodroma neglecta neglecta* — Kermadec Petrel (western subspecies)
45. *Sterna vittata vittata* — Antarctic Tern (Indian and Atlantic Ocean subspecies)
46. *Stipiturus malachurus parimeda* — Eyre Peninsula Southern Emu-wren
47. *Stipiturus mallee* — Mallee Emu-wren
48. *Strepera graculina crissalis* — Lord Howe Island Currawong
49. *Thalassarche bulleri* — Buller's Albatross
50. *Thalassarche carteri* — Indian Yellow-nosed Albatross
51. *Thalassarche cauta* — Shy Albatross
52. *Thalassarche chrysostoma* — Grey-headed Albatross
53. *Thalassarche impavida* — Campbell Albatross
54. *Thalassarche salvini* — Salvin's Albatross
55. *Thalassarche steadi* — White-capped Albatross
56. *Thalassarche nov.* sp. — Pacific Albatross
57. *Tricholimnas sylvestris* — Lord Howe Island Woodhen
58. *Turnix melanogaster* — Black-breasted Button-quail
59. *Turnix varia scintillans* — Albrolhos Painted Button-quail
60. *Tyto novaehollandiae kimberli* — Masked owl (northern subspecies)
61. *Tyto novaehollandiae melvillensis* — Masked owl (Melville Island subspecies)

Mammals

1. *Balaenoptera borealis* — Sei Whale
2. *Balaenoptera physalus* — Fin Whale
3. *Bettongia lesueur lesueur* — Boodie or Burrowing Bettong (Shark Bay)
4. *Bettongia lesueur* unnamed subsp. — Boodie or Burrowing Bettong (Barrow and Boodie Islands)
5. *Dasycercus byrnei* — Kowari
6. *Dasycercus cristicauda* — Mulgara
7. *Dasyurus geoffroii* — Chuditch
8. *Dasyurus maculatus maculatus* — Spot-tailed Quoll, Spotted-tailed Quoll or Tiger Quoll (south-eastern mainland and Tasmanian subspecies)
9. *Isoodon auratus auratus* — Golden Bandicoot (mainland)
10. *Isoodon auratus barrowensis* — Golden Bandicoot (Barrow Island)
11. *Isoodon obesulus nauticus* — Southern Brown Bandicoot (Nuyts Archipelago)
12. *Lagorchestes conspicillatus conspicillatus* — Spectacled Hare-wallaby (Barrow Island)
13. *Lagorchestes hirsutus bernieri* — Rufous Hare-wallaby (Bernier Island)
14. *Lagorchestes hirsutus dorreae* — Rufous Hare-wallaby (Dorre Island)
15. *Lagostrophus fasciatus fasciatus* — Banded Hare-wallaby or Marnine or Munning
16. *Leporillus conditor* — Wopilkara or Greater Stick-nest Rat
17. *Macroderma gigas* — Ghost Bat
18. *Macropus robustus isabellinus* — Barrow Island Euro
19. *Macrotis lagotis* — Greater Bilby
20. *Megaptera novaeangliae* — Humpback Whale
21. *Mesembriomys macrurus* — Golden-backed Tree-rat
22. *Myrmecobius fasciatus* — Numbat

23. *Notomys aquilo* Northern Hopping-mouse
24. *Notomys fuscus* Wilkinti or Dusky Hopping-mouse
25. *Perameles gunnii gunnii* Eastern Barred Bandicoot (Tasmania)
26. *Petaurus australis* unnamed subsp. Fluffy Glider or Yellow-bellied Glider (Wet Tropics)
27. *Petrogale lateralis lateralis* Black-flanked Rock-wallaby
28. *Petrogale lateralis hackettii* Recherche Rock-wallaby
29. *Petrogale lateralis pearsoni* Pearson Island Rock-wallaby
30. *Petrogale lateralis* MacDonnell Ranges race Warru or Black-footed Rock-wallaby (MacDonnell Ranges race)
31. *Petrogale lateralis* West Kimberley race Black-footed Rock-wallaby (West Kimberley race)
32. *Petrogale penicillata* Brush-tailed Rock-wallaby
33. *Petrogale xanthopus xanthopus* Yellow-footed Rock-wallaby (South Australia and New South Wales)
34. *Potorous tridactylus tridactylus* Long-nosed Potoroo (south-east mainland)
35. *Pseudantechinus mimulus* Carpentarian Antechinus
36. *Pseudocheirus occidentalis* Western Ringtail Possum
37. *Pseudomys australis* Plains Rat
38. *Pseudomys fieldi* Djoongari
39. *Pseudomys pillagaensis* Pilliga Mouse
40. *Pseudomys shortridgei* Dayang or Heath Rat
41. *Setonix brachyurus* Quokka
42. *Sminthopsis butleri* Butler's Dunnart
43. *Sminthopsis griseoventer boullangerensis* Boullanger Island Dunnart
44. *Vombatus ursinus ursinus* Common Wombat (Bass Strait)
45. *Xeromys myoides* False Water-rat

Non-vascular Plant

Pseudocephalozia paludicola

Plants

1. *Acacia ammophila*
2. *Acacia anomala*
3. *Acacia aphylla*
4. *Acacia araneosa*
5. *Acacia attenuata*
6. *Acacia awestoniana*
7. *Acacia axillaris*
8. *Acacia bynoeana*
9. *Acacia caerulescens*
10. *Acacia carnei*
11. *Acacia chinchillensis*
12. *Acacia constablei*
13. *Acacia courtii*
14. *Acacia crombiei*
15. *Acacia curranii*
16. *Acacia denticulosa*
17. *Acacia depressa*
18. *Acacia deuteroneura*
19. *Acacia eremophiloides*
20. *Acacia flocktoniae*
21. *Acacia forrestiana*
22. *Acacia georgensis*
23. *Acacia glandulicarpa*

24. *Acacia grandifolia*
25. *Acacia guymeri*
26. *Acacia handonis*
27. *Acacia imbricata*
28. *Acacia latzii*
29. *Acacia lauta*
30. *Acacia macnuttiana*
31. *Acacia menzelii*
32. *Acacia perangusta*
33. *Acacia peuce*
34. *Acacia phasmoides*
35. *Acacia pickardii*
36. *Acacia pubescens*
37. *Acacia pubifolia*
38. *Acacia purpureapetala*
39. *Acacia pycnostachya*
40. *Acacia ramiflora*
41. *Acacia rhetinocarpa*
42. *Acacia semicircinalis*
43. *Acacia sp.McIvor River (J.R.Clarkson 5475)*
44. *Acacia undoolyana*
45. *Acacia wardellii*
46. *Acriopsis javanica*
47. *Acrophyllum australe*
48. *Actephila foetida*
49. *Actinotus schwarzii*
50. *Adenanthos ellipticus*
51. *Adenanthos pungens subsp. pungens*
52. *Allocasuarina duncanii*
53. *Allocasuarina fibrosa*
54. *Allocasuarina simulans*
55. *Allocasuarina tortiramula*
56. *Alloxylon flammeum*
57. *Almaleea cambagei*
58. *Ammobium craspedioides*
59. *Amphibromus fluitans*
60. *Andersonia pinaster Lemson ms.*
61. *Angophora inopina*
62. *Angophora robur*
63. *Anigozanthos humilis subsp. chrysanthus*
64. *Anigozanthos viridis subsp. terraspectans*
65. *Anthocercis gracilis*
66. *Apatophyllum olsenii*
67. *Aphanes pentamera*
68. *Apium prostratum subsp. phillipii Keighery ms*
69. *Archidendron lovelliae*
70. *Arenga australasica*
71. *Aristida annua*
72. *Arthraxon hispidus*
73. *Asperula asthenes*
74. *Asplenium hookerianum*
75. *Asplenium pellucidum*

76. *Asplenium wildii*
77. *Astelia australiana*
78. *Asterolasia nivea*
79. *Asterolasia phebalioides*
80. *Astrotricha crassifolia*
81. *Atriplex infrequens*
82. *Babingtonia crenatifolia*
83. *Babingtonia granitica*
84. *Baeckea tozerensis*
85. *Baloghia marmorata*
86. *Banksia goodii*
87. *Banksia sphaerocarpa var. dolichostyla*
88. *Banksia verticillata*
89. *Basedowia tenerrima*
90. *Bertya pinifolia*
91. *Bertya sp. Winneba (D.Jermyn 31)*
92. *Bertya sp.Cobar-Coolabah (Cunningham & Milthorpe s.n.,2/8/73)*
93. *Bertya sp.Mt Ernest (G.Leiper AQ 507685)*
94. *Beyeria subtecta*
95. *Boronia adamsiana*
96. *Boronia deanei*
97. *Boronia galbraithiae*
98. *Boronia keysii*
99. *Boronia laxa Duretto ms*
100. *Boronia quadrilata Duretto ms*
101. *Boronia rupicola*
102. *Boronia suberosa*
103. *Boronia tolerans*
104. *Boronia umbellata*
105. *Boronia verecunda*
106. *Boronia viridiflora*
107. *Boronia xanthastrum*
108. *Bosistoa selwynii*
109. *Bosistoa transversa*
110. *Bossiaea oligosperma*
111. *Bothriochloa biloba*
112. *Bothriochloa bunyensis*
113. *Brachychiton vitifolius*
114. *Brachyscome muelleroides*
115. *Brachyscome papillosa*
116. *Brachysema modestum*
117. *Bracteantha palustris*
118. *Budawangia gnidioides*
119. *Bulbophyllum globuliforme*
120. *Bulbophyllum gracillimum*
121. *Bulbophyllum longiflorum*
122. *Cadellia pentastylis*
123. *Caladenia brumalis*
124. *Caladenia bryceana subsp. cracens Hopper & A.P.Brown ms.*
125. *Caladenia calcicola*
126. *Caladenia carnea var. ornata*
127. *Caladenia caudata*

128. *Caladenia ceasarea subsp. maritima*
129. *Caladenia christineae Hopper & A.P. Brown ms.*
130. *Caladenia concolor*
131. *Caladenia formosa*
132. *Caladenia harringtoniae Hopper & A.P. Brown ms.*
133. *Caladenia insularis*
134. *Caladenia ovata*
135. *Caladenia tessellata*
136. *Caladenia versicolor*
137. *Caladenia wanosa*
138. *Caladenia woolcockiorum*
139. *Calamus warburgii*
140. *Calectasia arnoldii Dixon ms.*
141. *Callistemon forresterae*
142. *Callistemon kenmorrisonii*
143. *Callistemon pungens*
144. *Callistemon sp.Boulia (L.Pedley 5297)*
145. *Callitriche cyclocarpa*
146. *Callitris oblonga*
147. *Calophyllum bicolor*
148. *Calotis glandulosa*
149. *Calytrix gurulmundensis*
150. *Canarium acutifolium var. acutifolium*
151. *Canthium costatum*
152. *Capparis thozetiana*
153. *Carex paupera*
154. *Carex tasmanica*
155. *Carmona retusa*
156. *Cassinia rugata*
157. *Centotheca philippensis*
158. *Centrolepis monogyna subsp. paludicola*
159. *Centrolepis pedderensis*
160. *Chamaesyce carrisoides*
161. *Chamelaucium griffinii N.G.Marchant & Keighery ms*
162. *Chamelaucium roycei*
163. *Cheiranthera volubilis*
164. *Chordifex chaunocoleus L.A.S.Johnson & B.G.Briggs ms.*
165. *Clematis fawcettii*
166. *Codonocarpus pyramidalis*
167. *Colobanthus curtisiae*
168. *Comesperma oblongatum*
169. *Commersonia sp. Cardarga (G.P. Guymer 1642)*
170. *Conospermum undulatum*
171. *Conostylis rogeri*
172. *Coopernookia scabridiuscula*
173. *Corokia whiteana*
174. *Correa baeuerlenii*
175. *Correa calycina*
176. *Corybas dentatus*
177. *Corybas limpidus*
178. *Corybas montanus*
179. *Corymbia clandestina*

180. *Corynocarpus rupestris subsp. rupestris*
181. *Croton magneticus*
182. *Cryptocarya foetida*
183. *Cryptostylis hunteriana*
184. *Ctenopteris blechnoides*
185. *Ctenopteris walleri*
186. *Cupaniopsis shirleyana*
187. *Cupaniopsis tomentella*
188. *Cycas cairnsiana*
189. *Cycas platyphylla*
190. *Cycas silvestris*
191. *Cyperus semifertilis*
192. *Darwinia biflora*
193. *Darwinia macrostegia*
194. *Darwinia masonii*
195. *Darwinia meeboldii*
196. *Darwinia sp. Stirling Range (G.J. Keighery 5732)*
197. *Darwinia squarrosa*
198. *Daviesia dielsii*
199. *Daviesia discolor*
200. *Daviesia elongata subsp. elongata*
201. *Daviesia laevis*
202. *Daviesia spiralis*
203. *Dendrobium bigibbum*
204. *Dendrobium callitrophilum*
205. *Dendrobium carronii*
206. *Dendrobium johannis*
207. *Dendrobium phalaenopsis*
208. *Dendrobium x superbiens*
209. *Denhamia parvifolia*
210. *Desmodium acanthocladum*
211. *Deyeuxia pungens*
212. *Dichanthium queenslandicum*
213. *Dichanthium setosum*
214. *Dillwynia tenuifolia*
215. *Dioclea hexandra*
216. *Diplazium cordifolium*
217. *Dischidia littoralis*
218. *Diuris aequalis*
219. *Diuris drummondii*
220. *Diuris micrantha*
221. *Diuris ochroma*
222. *Diuris praecox*
223. *Diuris sheaffiana*
224. *Diuris venosa*
225. *Dodonaea procumbens*
226. *Dodonaea rupicola*
227. *Drakaea concolor Hopper & A.P. Brown ms.*
228. *Drakaea micrantha Hopper & A.P. Brown ms.*
229. *Drakonorchis barbarella Hopper & A.P. Brown ms.*
230. *Drosera fimbriata*
231. *Drosera prolifera*

232. *Drosera schizandra*
233. *Drummondita longifolia*
234. *Dryandra serratuloides subsp. perissa*
235. *Dryandra serratuloides subsp. serratuloides*
236. *Dryandra squarrosa subsp. argillacea*
237. *Ectrosia blakei*
238. *Eleocharis keigheryi*
239. *Eleocharis obicis*
240. *Eleocharis retroflexa*
241. *Endiandra hayesii*
242. *Epacris limbata*
243. *Epacris sparsa*
244. *Epilobium brunnescens subsp. beaugleholei*
245. *Eremophila microtheca*
246. *Eremophila sp. Rainbow Valley (Henshall 1181)*
247. *Eremophila tetraptera*
248. *Eriostemon sporadica*
249. *Erythranthera pumila*
250. *Eucalyptus aquatica*
251. *Eucalyptus argophloia*
252. *Eucalyptus argutifolia*
253. *Eucalyptus articulata*
254. *Eucalyptus beaniana*
255. *Eucalyptus benthamii*
256. *Eucalyptus blaxellii*
257. *Eucalyptus cadens*
258. *Eucalyptus caleyi subsp. ovendenii*
259. *Eucalyptus camfieldii*
260. *Eucalyptus cannonii*
261. *Eucalyptus ceracea*
262. *Eucalyptus cerasiformis*
263. *Eucalyptus coronata*
264. *Eucalyptus crispata*
265. *Eucalyptus crucis subsp. crucis*
266. *Eucalyptus glaucina*
267. *Eucalyptus hallii*
268. *Eucalyptus impensa*
269. *Eucalyptus infera*
270. *Eucalyptus johnsoniana*
271. *Eucalyptus kabiana*
272. *Eucalyptus kartzoffiana*
273. *Eucalyptus langleyi*
274. *Eucalyptus lateritica*
275. *Eucalyptus leptoloma*
276. *Eucalyptus mckieana*
277. *Eucalyptus merrickiae*
278. *Eucalyptus mooreana*
279. *Eucalyptus nicholii*
280. *Eucalyptus olivacea Brooker & Hopper ms.*
281. *Eucalyptus paedoglauca*
282. *Eucalyptus parramattensis subsp. decadens*
283. *Eucalyptus parvula*

284. *Eucalyptus platydisca L.A.S.Johnson & K.Hill ms.*
285. *Eucalyptus pulverulenta*
286. *Eucalyptus pumila*
287. *Eucalyptus raveretiana*
288. *Eucalyptus rhodantha var. rhodantha*
289. *Eucalyptus rhodops*
290. *Eucalyptus robertsonii subsp. hemisphaerica*
291. *Eucalyptus rubida subsp. barbigororum*
292. *Eucalyptus rubida subsp. canobolensis*
293. *Eucalyptus scoparia*
294. *Eucalyptus steedmanii*
295. *Eucalyptus strzeleckii*
296. *Eucalyptus suberea*
297. *Eucalyptus synandra*
298. *Eucalyptus tetrapleura*
299. *Eucalyptus virens*
300. *Eucalyptus xanthope*
301. *Euchiton nitidulus*
302. *Eucryphia wilkiei*
303. *Euphrasia amphisysepala*
304. *Euphrasia bella*
305. *Euphrasia bowdeniae*
306. *Euphrasia crassiuscula subsp. glandulifera*
307. *Euphrasia eichleri*
308. *Euphrasia phragmostoma*
309. *Floydia praealta*
310. *Fontainea australis*
311. *Fontainea rostrata*
312. *Fontainea venosa*
313. *Gardenia psidioides*
314. *Gastrolobium appressum*
315. *Gentiana bredboensis*
316. *Gentiana wissmannii*
317. *Germainia capitata*
318. *Glycine latrobeana*
319. *Goodenia integerrima*
320. *Goodenia macbarronii*
321. *Goodenia quadrifida*
322. *Grammitis reinwardtii*
323. *Graptophyllum ilicifolium*
324. *Grastidium tozerense*
325. *Grevillea banyabba*
326. *Grevillea bedggoodiana*
327. *Grevillea brachystylis subsp. australis*
328. *Grevillea celata*
329. *Grevillea elongata P.Olde ms.*
330. *Grevillea evansiana*
331. *Grevillea flexuosa*
332. *Grevillea floripendula*
333. *Grevillea glossadenia*
334. *Grevillea infecunda*
335. *Grevillea kennedyana*

336. *Grevillea montis-cole subsp. brevistyla*
337. *Grevillea parviflora subsp. parviflora*
338. *Grevillea quadricauda*
339. *Grevillea rhizomatosa*
340. *Grevillea scortechinii subsp. sarmentosa*
341. *Grevillea scortechinii subsp. scortechinii*
342. *Grevillea shiressii*
343. *Grevillea treueriana*
344. *Grevillea venusta*
345. *Gulubia costata*
346. *Hakea aculeata*
347. *Hakea fraseri*
348. *Hakea megalosperma*
349. *Hakea sp.Manning River SF-Broken Bago SF*
350. *Hakea trineura*
351. *Haloragis exalata subsp. exalata*
352. *Haloragis exalata subsp. velutina*
353. *Halosarcia bulbosa*
354. *Halosarcia flabelliformis*
355. *Helicteres sp. Glenluckie Creek (N. Byrnes 1280)*
356. *Hemigenia viscida*
357. *Hensmania chapmanii*
358. *Hexaspora pubescens*
359. *Hibbertia crispula*
360. *Hibbertia humifusa subsp. debilis*
361. *Hibbertia humifusa subsp. erigens*
362. *Hibbertia marginata*
363. *Hicksbeachia pinnatifolia*
364. *Hodgkinsonia frutescens*
365. *Homopholis belsonii*
366. *Homoranthus darwinioides*
367. *Homoranthus decumbens*
368. *Homoranthus lunatus*
369. *Homoranthus montanus*
370. *Homoranthus porteri*
371. *Homoranthus prolixus*
372. *Huperzia lockyeri*
373. *Huperzia marsupiiformis*
374. *Huperzia phlegmarioides*
375. *Huperzia prolifera*
376. *Hydrocharis dubia*
377. *Ipomoea sp. Stirling (P. Latz 10408)*
378. *Isopogon fletcheri*
379. *Ixodia achillaeoides subsp. arenicola*
380. *Jedda multicaulis*
381. *Kelleria laxa*
382. *Kennedia glabrata*
383. *Kennedia retrorsa*
384. *Kunzea cambagei*
385. *Kunzea pauciflora*
386. *Kunzea rupestris*
387. *Lasiopetalum joyceae*

388. *Lasiopetalum longistamineum*
389. *Lasiopetalum micranthum*
390. *Lastreopsis walleri*
391. *Lawrencia buchananensis*
392. *Laxmannia jamesii*
393. *Lechenaultia chlorantha*
394. *Leionema obtusifolium*
395. *Leionema ralstonii*
396. *Leionema sympetalum*
397. *Lepidium aschersonii*
398. *Lepidium catapycnon*
399. *Lepidium pseudopapillosum*
400. *Leptomeria dielsiana*
401. *Leptorhynchos gatesii*
402. *Leptospermum deanei*
403. *Leptospermum thompsonii*
404. *Leucopogon cuspidatus*
405. *Leucopogon exolasius*
406. *Limosella granitica*
407. *Lindsaea pulchella var. blanda*
408. *Livistona lanuginosa*
409. *Livistona mariae subsp. mariae*
410. *Logania diffusa*
411. *Logania insularis*
412. *Macadamia claudiensis*
413. *Macadamia integrifolia*
414. *Macadamia ternifolia*
415. *Macadamia tetraphylla*
416. *Macropteranthes montana*
417. *Macrozamia conferta*
418. *Macrozamia crassifolia*
419. *Macrozamia fearnsidei*
420. *Macrozamia macdonnellii*
421. *Macrozamia machinii*
422. *Macrozamia occidua*
423. *Macrozamia parcifolia*
424. *Maireana cheelii*
425. *Maireana melanocarpa*
426. *Marsdenia brevifolia*
427. *Marsdenia coronata*
428. *Marsdenia longiloba*
429. *Marsdenia paludicola*
430. *Medicosma elliptica*
431. *Medicosma obovata*
432. *Melaleuca biconvexa*
433. *Melaleuca kunzeoides*
434. *Mesua sp. Boonjee (A.K. Irvine 1218)*
435. *Meziella trifida*
436. *Microcorys eremophiloides*
437. *Microlepidium alatum*
438. *Micromyrtus blakelyi*
439. *Micromyrtus minutiflora*

440. Microtis globula
441. Minuria tridens
442. Myoporum cordifolium
443. Myriophyllum coronatum
444. Myriophyllum porcatum
445. Myrmecodia beccarii
446. Neisosperma kilneri
447. Nematolepis frondosa
448. Nematolepis rhytidophyllum
449. Nematolepis squamea subsp. coriacea
450. Nematolepis wilsonii
451. Neoastelia spectabilis
452. Neoroepera buxifolia
453. Newcastelia velutina
454. Notelaea lloydii
455. Olax angulata
456. Olearia astroloba
457. Olearia cordata
458. Olearia macdonnellensis
459. Olearia pannosa subsp. pannosa
460. Omphalea celata
461. Oreodendron biflorum
462. Oreoporanthera petalifera
463. Owenia cepiodora
464. Ozothamnus eriocephalus
465. Ozothamnus tesselatus
466. Ozothamnus vagans
467. Parsonsia larcomensis
468. Paspalidium grandispiculatum
469. Persicaria elatior
470. Persoonia acerosa
471. Persoonia bargoensis
472. Persoonia glaucescens
473. Persoonia marginata
474. Phaius pictus
475. Phebalium glandulosum subsp. eglandulosum
476. Phebalium lowanense
477. Phebalium whitei
478. Philotheca acrolopha
479. Philotheca ericifolia
480. Philotheca sporadica
481. Phyllota humifusa
482. Picris evae
483. Pimelea curviflora var. curviflora
484. Pimelea leptospermoides
485. Pimelea pagophila
486. Pimelea rara
487. Pimelea spinescens subsp. spinescens
488. Pityrodia augustensis
489. Plectrachne bromoides
490. Plectranthus gratus
491. Plectranthus leiperi

492. *Pleuropappus phyllocalymmeus*
493. *Pleurophascum occidentale*
494. *Plinthanthesis rodwayi*
495. *Poa sallacustris*
496. *Polyscias bellendenkerensis*
497. *Pomaderris brunnea*
498. *Pomaderris clivicola*
499. *Pomaderris gilmourii var. cana*
500. *Pomaderris halmaturina subsp. halmaturina*
501. *Pomaderris pallida*
502. *Pomaderris parrisiae*
503. *Pomaderris sericea*
504. *Pomaderris subplicata*
505. *Pomatocalpa marsupiale*
506. *Prasophyllum colemaniae*
507. *Prasophyllum fuscum*
508. *Prasophyllum morganii*
509. *Prasophyllum pallidum*
510. *Prasophyllum spicatum*
511. *Prasophyllum validum*
512. *Prasophyllum wallum*
513. *Pratia gelida*
514. *Prostanthera calycina*
515. *Prostanthera cineolifera*
516. *Prostanthera cryptandroides*
517. *Prostanthera densa*
518. *Prostanthera discolor*
519. *Prostanthera galbraithiae*
520. *Prostanthera nudula*
521. *Prostanthera sp. Dunmore (D.M. Gordon 84)*
522. *Prostanthera staurophylla*
523. *Prostanthera stricta*
524. *Pterostylis arenicola*
525. *Pterostylis bicornis*
526. *Pterostylis cheraphila*
527. *Pterostylis chlorogramma*
528. *Pterostylis cobarensis*
529. *Pterostylis cucullata*
530. *Pterostylis pulchella*
531. *Pterostylis sp. Eyre Peninsula (R.Bates 19474)*
532. *Pterostylis tenuissima*
533. *Pterostylis xerophila*
534. *Ptilotus beckerianus*
535. *Ptychosema pusillum*
536. *Pultenaea aristata*
537. *Pultenaea baeuerlenii*
538. *Pultenaea campbellii*
539. *Pultenaea glabra*
540. *Pultenaea parrisiae subsp. parrisiae*
541. *Pultenaea parviflora*
542. *Pultenaea pauciflora*
543. *Pultenaea setulosa*

544. *Pultenaea stuartiana*
545. *Pultenaea trichophylla*
546. *Pultenaea villifera var. glabrescens*
547. *Pultenaea williamsoniana*
548. *Quassia bidwillii*
549. *Ranunculus anemoneus*
550. *Restio longipes*
551. *Rhagodia acicularis*
552. *Rhaphidospora bonneyana*
553. *Rhinerrhiza moorei*
554. *Ricinocarpos gloria-medii*
555. *Ristantia gouldii*
556. *Romnalda strobilacea*
557. *Rulingia procumbens*
558. *Rutidosis heterogama*
559. *Rutidosis leiolepis*
560. *Sarcochilus fitzgeraldii*
561. *Sarcochilus hartmannii*
562. *Sarcochilus hirticalcar*
563. *Sarcochilus roseus*
564. *Sarcochilus weinthalii*
565. *Sauropus filicinus*
566. *Sauropus macranthus*
567. *Sclerolaena blakei*
568. *Sclerolaena walkeri*
569. *Senecio garlandii*
570. *Senecio laticostatus*
571. *Senecio macrocarpus*
572. *Senecio megaglossus*
573. *Senecio psilocarpus*
574. *Solanum carduiforme*
575. *Solanum dunalianum*
576. *Solanum karsense*
577. *Sophora fraseri*
578. *Sowerbaea subtilis*
579. *Spathoglottis plicata*
580. *Spyridium coactilifolium*
581. *Spyridium eriocephalum var. glabrisepalum*
582. *Spyridium obcordatum*
583. *Stackhousia annua*
584. *Stawellia dimorphantha*
585. *Stemmacantha australis*
586. *Stemona angusta*
587. *Stipa metatoris*
588. *Stipa nullanulla*
589. *Stylidium galioides*
590. *Stylidium merrallii*
591. *Styphelia perileuca*
592. *Swainsona murrayana*
593. *Swainsona plagiotropis*
594. *Swainsona pyrophila*
595. *Symplocos baeuerlenii*

596. *Syzygium hodgkinsoniae*
597. *Syzygium moorei*
598. *Syzygium paniculatum*
599. *Syzygium velarum*
600. *Taraxacum cygnorum*
601. *Tasmannia glaucifolia*
602. *Tasmannia purpurascens*
603. *Tephrosia leveillei*
604. *Tetraria australiensis*
605. *Tetratheca aphylla*
606. *Tetratheca glandulosa*
607. *Tetratheca harperi*
608. *Tetratheca juncea*
609. *Thelymitra mackibbinii*
610. *Thelymitra matthewsii*
611. *Thelymitra psammophila*
612. *Thesium australe*
613. *Thomasia glabripetala*
614. *Thomasia montana*
615. *Thryptomene wittweri*
616. *Tinospora tinosporoides*
617. *Tribonanthes purpurea*
618. *Trichanthodium baracchianum*
619. *Trichoglottis australiensis*
620. *Trigonostemon inopinatus*
621. *Triplarina nitchaga*
622. *Trymalium minutiflorum*
623. *Tylophora williamsii*
624. *Vanda hindsii*
625. *Velleia perfoliata*
626. *Verticordia carinata*
627. *Verticordia crebra*
628. *Verticordia fimbrilepis subsp. australis*
629. *Verticordia helichrysantha*
630. *Westringia cremnophila*
631. *Westringia davidii*
632. *Westringia parvifolia*
633. *Westringia rupicola*
634. *Wodyetia bifurcata*
635. *Wrixonia schultzii*
636. *Xanthorrhoea arenaria*
637. *Xanthostemon oppositifolius*
638. *Xanthostemon youngii*
639. *Xerothamnella parvifolia*
640. *Xyris exilis*
641. *Zeuxine polygonoides*
642. *Zieria citriodora J.A. Armstrong ms.*
643. *Zieria collina*
644. *Zieria involucrata*
645. *Zieria murphyi*
646. *Zieria obovata (C.T. White) J.A. Armstrong ms.*
647. *Zieria rimulosa*

648.Zieria sp. Monogorilby (P.I.Forster PIF 1004)
649.Zieria tuberculata J.A. Armstrong ms.

SPECIES THAT ARE EXTINCT

Genus, species (subspecies, population)	Common Name
Animals	
Fish	
nil	
Amphibians	
1. *Rheobatrachus silus*	Gastric-brooding Frog
2. *Rheobatrachus vitellinus*	Eungella Gastric-brooding Frog
3. *Taudactylus acutirostris*	Sharp-snouted Day Frog
4. *Taudactylus diurnus*	Southern Day Frog
Reptiles	
nil	
Birds	
1. *Aplonis fusca*	Norfolk Island Starling
2. *Columba vitiensis godmanae*	Lord Howe Pigeon
3. *Cyanoramphus novaezelandiae erythrotis*	Macquarie Island Parakeet
4. *Cyanoramphus novaezelandiae subflavescens*	Lord Howe Parakeet
5. *Dasyornis broadbenti littoralis*	South-western Rufous Bristlebird
6. *Dromaius baudinianus*	Kangaroo Island Emu
7. *Dromaius minor*	Dwarf Emu/King Island Emu
8. *Dromaius novaehollandiae diemenensis*	Emu (Tasmanian subspecies)
9. *Drymodes superciliaris colcloughi*	Roper River Scrub-robin
10. *Gerygone insularis*	Lord Howe Warbler
11. *Hemiphaga novaeseelandiae spadicea*	New Zealand Pigeon (Norfolk Island race)
12. *Lalage leucopyga leucopyga*	Norfolk Island Long-tailed Triller
13. *Nestor productus*	Norfolk Island Kaka
14. *Ninox novaeseelandiae albaria*	Lord Howe Boobook Owl
15. *Notornis alba*	White Gallinule
16. *Psephotus pulcherrimus*	Paradise Parrot
17. *Rallus pectoralis clelandi*	Lewin's Water Rail (western race)
18. *Rallus philippensis maquariensis*	Macquarie Island Rail
19. *Rhipidura cervina*	Lord Howe Fantail
20. *Turdus xanthopus vinitinctus*	Lord Howe Island Vinous-tinted Thrush
21. *Turdus poliocephalus poliocephalus*	Norfolk Island Thrush
22. *Zosterops albogularis*	Norfolk Island Silvereye
23. *Zosterops strenua*	Robust White-eye
Mammals	
1. *Bettongia gaimardi gaimardi*	Eastern Bettong (mainland)
2. *Bettongia lesueur graii*	Boodie or Burrowing Bettong (inland)
3. *Bettongia penicillata penicillata*	Brush-tailed Bettong (south-east mainland)
4. *Caloprymnus campestris*	Desert Rat-kangaroo
5. *Chaeropus ecaudatus*	Pig-footed Bandicoot
6. *Conilurus albipes*	White-footed Rabbit-rat
7. *Lagorchestes asomatus*	Central Hare-wallaby

8. *Lagorchestes hirsutus hirsutus*	Rufous Hare-wallaby (south-west mainland)
9. *Lagorchestes leporides*	Eastern Hare-wallaby
10. *Lagostrophus fasciatus albipilis*	Banded Hare-wallaby (mainland)
11. *Leporillus apicalis*	Lesser Stick-nest Rat
12. *Macropus eugenii eugenii*	Tammar Wallaby (South Australia)
13. *Macropus greyi*	Toolache Wallaby
14. *Macrotis leucura*	Lesser Bilby
15. *Notomys amplus*	Short-tailed Hopping-mouse
16. *Notomys longicaudatus*	Long-tailed Hopping-mouse
17. *Notomys macrotis*	Big-eared Hopping-mouse
18. *Notomys mordax*	Darling Downs Hopping-mouse
19. *Onychogalea lunata*	Crescent Nailtail Wallaby
20. *Perameles bougainville fasciata*	Western Barred Bandicoot (mainland)
21. *Perameles eremiana*	Desert Bandicoot
22. *Potorous platyops*	Broad-faced Potoroo
23. *Pseudomys gouldii*	Gould's Mouse
24. *Pteropus brunneus*	Percy Island Flying Fox
25. *Rattus macleari*	Christmas Island Rat
26. *Rattus nativitatis*	Christmas Island Rat
27. *Thylacinus cynocephalus*	Thylacine

Plants

1. *Acacia kingiana*
2. *Acacia prismifolia*
3. *Acanthocladium dockeri*
4. *Acianthus ledwardii*
5. *Amperea xiphoclada* var. *pedicellata*
6. *Amphibromus whitei*
7. *Argyreia soutteri*
8. *Caladenia atkinsonii*
9. *Caladenia brachyscapa*
10. *Caladenia pumila*
11. *Calothamnus accedens*
12. *Coleanthera virgata*
13. *Deyeuxia lawrencei*
14. *Didymoglossum exiguum*
15. *Dimocarpus leichhardtii*
16. *Diplocaulobium masonii*
17. *Diuris bracteata*
18. *Eremophila vernicosa Chinnock ms.*
19. *Philotheca falcata*
20. *Euphrasia arguta*
21. *Euphrasia sp. Tamworth (Rupp sn. -/9/1904)*
22. *Frankenia conferta*
23. *Frankenia decurrens*
24. *Frankenia parvula*
25. *Gyrostemon reticulatus*
26. *Haloragis platycarpa*
27. *Hemigenia clotteniana*
28. *Hutchinsia tasmanica*
29. *Huperzia serrata*
30. *Hydatella leptogyne*
31. *Hymenophyllum lobbii*
32. *Hymenophyllum whitei*

33. *Hypsela sessiliflora*
34. *Lemmaphyllum accedens*
35. *Lepidium drummondii*
36. *Lepidium peregrinum*
37. *Leucopogon cryptanthus*
38. *Lycopodium volubile*
39. *Marsdenia araujacea*
40. *Monogramma dareicarpa*
41. *Musa fitzalanii*
42. *Nemcia lehmannii*
43. *Oberonia attenuata*
44. *Olearia oliganthema*
45. *Opercularia acolytantha*
46. *Ozothamnus selaginoides*
47. *Paspalum batianoffii*
48. *Persoonia laxa*
49. *Persoonia prostrata*
50. *Philotheca falcata*
51. *Pimelea spinescens subsp. pubiflora*
52. *Prasophyllum robustum*
53. *Prostanthera albo-hirta*
54. *Prostanthera marifolia*
55. *Pseudanthus nematophorus*
56. *Pterostylis valida*
57. *Ptilotus fasciculatus*
58. *Ptilotus pyramidatus*
59. *Pultenaea maidenii*
60. *Senecio georgianus*
61. *Tetratheca fasciculata*
62. *Thomasia gardneri*
63. *Tmesipteris lanceolata*
64. *Trianthema cypseleoides*

ECOLOGICAL COMMUNITIES THAT ARE ENDANGERED

1 Aquatic Root Mat Community 1 in Caves of the Leeuwin Naturaliste Ridge
2 Aquatic Root Mat Community 2 in Caves of the Leeuwin Naturaliste Ridge
3 Aquatic Root Mat Community 3 in Caves of the Leeuwin Naturaliste Ridge
4 Aquatic Root Mat Community 4 in Caves of the Leeuwin Naturaliste Ridge
5 Aquatic Root Mat Community in Caves of the Swan Coastal Plain
6 Assemblages of plants and invertebrate animals of tumulus (organic mound) Springs of the Swan Coastal Plain
7 Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions
8 *Corymbia calophylla* - *Kingia australis* woodlands on heavy soils of the Swan Coastal Plain
9 *Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain
10 Cumberland Plain Woodland
11 Eastern Stirling Range Montane Heath and Thicket
12 Eastern Suburbs Banksia Scrub of the Sydney Region

13 Grassy White Box Woodlands
14 Natural Temperate Grassland of the Southern Tablelands of NSW and the Australian Capital Territory
15 Perched wetlands of the Wheatbelt region with extensive stands of living sheoak and paperbark across the lake floor (Toolibin Lake)
16 Sedgelands in Holocene dune swales of the southern Swan Coastal Plain
17 Semi-evergreen Vine Thickets of the Brigalow Belt South Bioregion in New South Wales
18 Shrublands and Woodlands of the eastern Swan Coastal Plain
19 Shrublands and Woodlands on Muchea Limestone of the Swan Coastal Plain
20 Shrublands and Woodlands on Perth to Gingin ironstone (Perth to Gingin ironstone association) of the Swan Coastal Plain

21 Shrublands on southern Swan Coastal Plain ironstones
22 Silurian Limestone Pomaderris Shrubland of the South East Corner and Australian Alps Bioregions
23 Thrombolite (microbial) community of coastal freshwater lakes of the Swan Coastal Plain (Lake Richmond)

KEY THREATENING PROCESSES

Predation by the European red fox (*Vulpes vulpes*)
Dieback caused by the root-rot fungus (*Phytophthora cinnamomi*)
Predation by feral cats
Competition and land degradation by feral rabbits
Competition and land degradation by feral goats
Incidental catch (or bycatch) of seabirds during oceanic longline fishing operations

Under s194 of the *Environment Protection and Biodiversity Act 1999*, copies of up-to-date lists will be made available for purchase for a reasonable price, at a prescribed place in each State and self-governing Territory. In addition to this, up-to-date lists will also be freely available on the internet.

Dated this 11th day of July 2000.

Minister for the Environment and Heritage

Extracts from Environment Protection and Biodiversity Conservation Act 1999

178 Listing of threatened species

(1) The Minister must, by legislative instrument, establish a list of threatened species divided into the following categories:
  (a) extinct;
  (b) extinct in the wild;
  (c) critically endangered;
  (d) endangered;
  (e) vulnerable;
  (f) conservation dependent.

(2) The list, as first established, must contain only the species contained in Schedule 1 to the *Endangered Species Protection Act 1992*, as in force immediately before the commencement of this Act.

(3) The Minister must include:
  (a) in the extinct category of the list, as first established, only the species mentioned in subsection (2) that were listed as presumed extinct; and
  (b) in the endangered category of the list, as first established, only the native species mentioned in subsection (2) that were listed as endangered; and
  (c) in the vulnerable category of the list, as first established, only the species mentioned in subsection (2) that were listed as vulnerable.

(4) If the Minister is satisfied that a species included in the list, as first established, in:
  (a) the extinct category; or
  (b) the endangered category; or
  (c) the vulnerable category;
  is not eligible to be included in that or any other category, or is eligible to be, or under subsection 186(3), (4) or (5) can be, included in another category, the Minister must, within 6 months after the commencement of this Act, amend the list accordingly in accordance with this Subdivision.

179 Categories of threatened species

(1) A native species is eligible to be included in the ***extinct*** category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.

(2) A native species is eligible to be included in the ***extinct in the wild*** category at a particular time if, at that time:
  (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
  (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.

(3) A native species is eligible to be included in the ***critically endangered*** category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

(4) A native species is eligible to be included in the ***endangered*** category at a particular time if, at that time:

(a) it is not critically endangered; and

(b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

(5) A native species is eligible to be included in the ***vulnerable*** category at a particular time if, at that time:

(a) it is not critically endangered or endangered; and

(b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

(6) A native species is eligible to be included in the ***conservation dependent*** category at a particular time if, at that time:

(a) the species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or

(b) the following subparagraphs are satisfied:

(i) the species is a species of fish;

(ii) the species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised;

(iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory;

(iv) cessation of the plan of management would adversely affect the conservation status of the species.

(7) In subsection (6):

fish includes all species of bony fish, sharks, rays, crustaceans, molluscs and other marine organisms, but does not include marine mammals or marine reptiles.

180 Native species of marine fish

(1) A native species of marine fish is eligible to be included in a category mentioned in a paragraph of subsection 178(1) at a particular time if, at that time, the species meets the prescribed criteria for that category.

(2) A subsection of section 179 referring to a category (the ***relevant category***) does not apply to a native species of marine fish if regulations are in force for the purposes of subsection (1) of this section prescribing criteria for the relevant category.

181 Listing of threatened ecological communities

(1) The Minister must, by legislative instrument, establish a list of threatened ecological communities divided into the following categories:

(a) critically endangered;

(b) endangered;

(c) vulnerable.

(2) Subject to subsection (3), the Minister must not include an ecological community in a particular category of the list, as first established, unless satisfied that the ecological community is eligible to be included in that category when the list is first published.

(3) The list, as first established, must contain only the ecological communities listed in Schedule 2 to the *Endangered Species Protection Act 1992* immediately before the commencement of this Act, and they must be listed in the endangered category.

(4) If the Minister is satisfied that an ecological community included in the endangered category of the list, as first established under subsection (3), is not eligible to be included in that or any other category, or is eligible to be included in another category, the Minister must, within 6 months after the commencement of this Act, amend the list accordingly in accordance with this Subdivision.

(5) To avoid doubt, the instrument first establishing the list under subsection (1) is not taken to have been a legislative instrument.

Note: When the list was first established, it was required to be established by instrument published in the Gazette.

182 Critically endangered, endangered and vulnerable communities

(1) An ecological community is eligible to be included in the ***critically endangered*** category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.

(2) An ecological community is eligible to be included in the ***endangered*** category at a particular time if, at that time:

(a) it is not critically endangered; and

(b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

(3) An ecological community is eligible to be included in the ***vulnerable*** category at a particular time if, at that time:

(a) it is not critically endangered nor endangered; and

(b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

183 Listing of key threatening processes

(1) The Minister must, by legislative instrument, establish a list of threatening processes that are key threatening processes.

(2) The list, as first established, must contain only the key threatening processes contained in Schedule 3 to the *Endangered Species Protection Act 1992*, as in force immediately before the commencement of this Act.

184 Minister may amend lists

Subject to this Subdivision, the Minister may, by legislative instrument, amend a list referred to in section 178, 181 or 183 by:

(a) including items in the list in accordance with Subdivision AA; or

(aa) including items in the list in accordance with subsection 186(3), (4) or (5); or

(b) deleting items from the list; or

(c) in the case of the list referred to in section 178 or 181—transferring items from one category in the list to another category in the list in accordance with Subdivision AA; or

(d) correcting an inaccuracy or updating the name of a listed threatened species or listed threatened ecological community.

Note: Part 4 of Chapter 3 (sunsetting) of the *Legislation Act 2003* does not apply to the instrument. See regulations made for the purposes of paragraph 54(2)(b) of that Act.

186 Amending list of threatened native species

Including native species in a category

(1) Subject to subsections (3), (4) and (5), the Minister must not include (whether as a result of a transfer or otherwise) a native species in a particular category unless satisfied that the native species is eligible to be included in that category.

(2) In deciding whether to include a native species in a particular category (whether as a result of a transfer or otherwise), the only matters the Minister may consider are matters relating to:

(a) whether the native species is eligible to be included in that category; or

(b) the effect that including the native species in that category could have on the survival of the native species.

Deleting native species from a category

(2A) The Minister must not delete (whether as a result of a transfer or otherwise) a native species from a particular category unless satisfied that:

(a) the native species is no longer eligible to be included in that category; or

(b) the inclusion of the native species in that category is not contributing, or will not contribute, to the survival of the native species.

(2B) In deciding whether to delete a native species from a particular category (whether as a result of a transfer or otherwise), the only matters the Minister may consider are matters relating to:

(a) whether the native species is eligible to be included in that category; or

(b) the effect that the inclusion of the native species in that category is having, or could have, on the survival of the native species.

Including similar species to an eligible species

(3) The Minister may include a native species in the critically endangered category if satisfied that:

(a) it so closely resembles in appearance, at any stage of its biological development, a species that is eligible to be included in that category (see subsection 179(3)) that it is difficult to differentiate between the 2 species; and

(b) this difficulty poses an additional threat to the last-mentioned species; and

(c) it would substantially promote the objects of this Act if the first-mentioned species were regarded as critically endangered.

(4) The Minister may include a native species in the endangered category if satisfied that:

(a) it so closely resembles in appearance, at any stage of its biological development, a species that is eligible to be included in that category (see subsection 179(4)) that it is difficult to differentiate between the 2 species; and

(b) this difficulty poses an additional threat to the last-mentioned species; and

(c) it would substantially promote the objects of this Act if the first-mentioned species were regarded as endangered.

(5) The Minister may include a native species in the vulnerable category if satisfied that:

(a) it so closely resembles in appearance, at any stage of its biological development, a species that is eligible to be included in that category (see subsection 179(5)) that it is difficult to differentiate between the 2 species; and

(b) this difficulty poses an additional threat to the last-mentioned species; and

(c) it would substantially promote the objects of this Act if the first-mentioned species were regarded as vulnerable.

187 Amending list of ecological communities

Including ecological communities in a category

(1) The Minister must not include (whether as a result of a transfer or otherwise) an ecological community in a particular category unless satisfied that the ecological community is eligible to be included in that category.

(2) In deciding whether to include an ecological community in a particular category (whether as a result of a transfer or otherwise), the only matters the Minister may consider are matters relating to:

(a) whether the ecological community is eligible to be included in that category; or

(b) the effect that including the ecological community in that category could have on the survival of the ecological community.

Deleting ecological communities from a category

(3) The Minister must not delete (whether as a result of a transfer or otherwise) an ecological community from a particular category unless satisfied that:

(a) the ecological community is no longer eligible to be included in that category; or

(b) the inclusion of the ecological community in that category is not contributing, or will not contribute, to the survival of the ecological community.

(4) In deciding whether to delete an ecological community from a particular category (whether as a result of a transfer or otherwise), the only matters the Minister may consider are matters relating to:

(a) whether the ecological community is eligible to be included in that category; or

(b) the effect that the inclusion of the ecological community in that category is having, or could have, on the survival of the ecological community.

188 Amending list of key threatening processes

(1) The Minister must not add a threatening process to the list unless satisfied that it is eligible to be treated as a key threatening process.

(2) The Minister must not delete a threatening process from the list unless satisfied that it is no longer eligible to be treated as a key threatening process.

(3) A process is a ***threatening process*** if it threatens, or may threaten, the survival, abundance or evolutionary development of a native species or ecological community.

(4) A threatening process is eligible to be treated as a key threatening process if:

(a) it could cause a native species or an ecological community to become eligible for listing in any category, other than conservation dependent; or

(b) it could cause a listed threatened species or a listed threatened ecological community to become eligible to be listed in another category representing a higher degree of endangerment; or

(c) it adversely affects 2 or more listed threatened species (other than conservation dependent species) or 2 or more listed threatened ecological communities.

196 Killing or injuring member of listed threatened species or community

(1) A person commits an offence if:

(a) the person takes an action; and

(b) the action results in the death or injury of a member of a species or a member of an ecological community; and

(c) the member is a member of a listed threatened species (except a conservation dependent species) or of a listed threatened ecological community; and

(d) the member is in or on a Commonwealth area.

Penalty:

(a) in the case of an aggravated offence—imprisonment for 2 years or 3,000 penalty units, or both;

(b) in any other case—imprisonment for 2 years or 1,000 penalty units, or both.

Note 1: For the extra element of an aggravated offence, see section 196F.

Note 2: This section does not apply in the circumstances described in section 197. A defendant bears an evidential burden in relation to those circumstances. See subsection 13.3(3) of the *Criminal Code*.

(2) Strict liability applies to paragraphs (1)(c) and (d).

Note: For ***strict liability***, see section 6.1 of the *Criminal Code*.

196A Strict liability for killing or injuring member of listed threatened species or community

(1) A person commits an offence if:

(a) the person takes an action; and

(b) the action results in the death or injury of a member of a native species or a member of an ecological community; and

(c) the member is a member of a listed threatened species (except a conservation dependent species) or of a listed threatened ecological community; and

(d) the member is in or on a Commonwealth area.

Penalty:

(a) in the case of an aggravated offence—1,500 penalty units;

(b) in any other case—500 penalty units.

Note 1: For the extra element of an aggravated offence, see section 196F.

Note 2: This section does not apply in the circumstances described in section 197. A defendant bears an evidential burden in relation to those circumstances. See subsection 13.3(3) of the *Criminal Code*.

(2) Strict liability applies to paragraphs (1)(a), (b), (c) and (d).

Note: For ***strict liability***, see section 6.1 of the *Criminal Code*.

196B Taking etc. member of listed threatened species or community

(1) A person commits an offence if:

(a) the person takes, trades, keeps or moves a member of a species or a member of an ecological community; and

(b) the member is a member of a listed threatened species (except a conservation dependent species) or a listed threatened ecological community; and

(c) the member is in or on a Commonwealth area.

Penalty:

(a) in the case of an aggravated offence—imprisonment for 2 years or 3,000 penalty units, or both;

(b) in any other case—imprisonment for 2 years or 1,000 penalty units, or both.

Note 1: For the extra element of an aggravated offence, see section 196F.

Note 2: This section does not apply in the circumstances described in section 197. A defendant bears an evidential burden in relation to those circumstances. See subsection 13.3(3) of the *Criminal Code*.

(2) Strict liability applies to paragraphs (1)(b) and (c).

Note: For ***strict liability***, see section 6.1 of the *Criminal Code*.

196C Strict liability for taking etc. member of listed threatened species or community

(1) A person commits an offence if:

(a) the person takes, trades, keeps or moves a member of a native species or a member of an ecological community; and

(b) the member is a member of a listed threatened species (except a conservation dependent species) or a listed threatened ecological community; and

(c) the member is in or on a Commonwealth area.

Penalty:

(a) in the case of an aggravated offence—1,500 penalty units;

(b) in any other case—500 penalty units.

Note 1: For the extra element of an aggravated offence, see section 196F.

Note 2: This section does not apply in the circumstances described in section 197. A defendant bears an evidential burden in relation to those circumstances. See subsection 13.3(3) of the *Criminal Code*.

(2) Strict liability applies to paragraphs (1)(a), (b) and (c).

Note: For ***strict liability***, see section 6.1 of the *Criminal Code*.

196D Trading etc. member of listed threatened species or community taken in Commonwealth area

(1) A person commits an offence if:

(a) the person trades, keeps or moves a member of a species or a member of an ecological community; and

(b) the member is a member of a listed threatened species (except a conservation dependent species) or a listed threatened ecological community; and

(c) the member has been taken in or on a Commonwealth area.

Penalty:

(a) in the case of an aggravated offence—imprisonment for 2 years or 3,000 penalty units, or both;

(b) in any other case—imprisonment for 2 years or 1,000 penalty units, or both.

Note 1: For the extra element of an aggravated offence, see section 196F.

Note 2: This section does not apply in the circumstances described in section 197. A defendant bears an evidential burden in relation to those circumstances. See subsection 13.3(3) of the *Criminal Code*.

(2) Strict liability applies to paragraphs (1)(b) and (c).

Note: For ***strict liability***, see section 6.1 of the *Criminal Code*.

196E Strict liability for trading etc. member of listed threatened species or community taken in Commonwealth area

(1) A person commits an offence if:

(a) the person trades, keeps or moves a member of a native species or a member of an ecological community; and

(b) the member is a member of a listed threatened species (except a conservation dependent species) or a listed threatened ecological community; and

(c) the member has been taken in or on a Commonwealth area.

Penalty:

(a) in the case of an aggravated offence—1,500 penalty units;

(b) in any other case—500 penalty units.

Note 1: For the extra element of an aggravated offence, see section 196F.

Note 2: This section does not apply in the circumstances described in section 197. A defendant bears an evidential burden in relation to those circumstances. See subsection 13.3(3) of the *Criminal Code*.

(2) Strict liability applies to paragraphs (1)(a), (b) and (c).

Note: For ***strict liability***, see section 6.1 of the *Criminal Code*.

196F Aggravated offence—member of listed threatened species that is a dugong or turtle

(1) For the purposes of this Subdivision, an offence against section 196, 196A, 196B, 196C, 196D or 196E (the ***underlying offence***) is an ***aggravated offence*** if the member to which the underlying offence relates is:

(a) a member of a listed threatened species; and

(b) a member of a species mentioned in paragraph 248(2)(f), (g) or (h).

Note: Marine turtles and leatherback turtles are members of the species mentioned in paragraphs 248(2)(g) and (h), and on the day this section commenced, these species were listed threatened species.

(2) If the prosecution intends to prove an aggravated offence, the charge must allege the relevant aggravated offence.

(3) Strict liability applies to the physical elements of circumstance, that the member is:

(a) a member of a listed threatened species; and

(b) a member of a species mentioned in paragraph 248(2)(f), (g) or (h).

Note: For strict liability, see section 6.1 of the *Criminal Code*.

197 Certain actions are not offences

Sections 196, 196A, 196B, 196C, 196D, 196E and 207B do not apply to:

(a) an action authorised by a permit that was issued under section 201 and is in force; or

(b) an action provided for by, and done in accordance with, a recovery plan in force under Division 5; or

(c) an action that is covered by an approval in operation under Part 9 for the purposes of subsection 18(1), (2), (3), (4), (5) or (6) or 18A(1) or (2); or

(d) an action that:

(i) is one of a class of actions declared by the Minister under section 33 not to require an approval under Part 9 for the purposes of subsection 18(1), (2), (3), (4), (5), or (6) or 18A(1) or (2); and

(ii) is taken in accordance with a management arrangement or authorisation process that is an accredited management arrangement or an accredited authorisation process for the purposes of the declaration; or

(da) an action that:

(i) is an action, or one of a class of actions, declared by the Minister under section 37A not to require an approval under Part 9 for the purposes of subsection 18(1), (2), (3), (4), (5), or (6) or 18A(1) or (2); and

(ii) is taken in accordance with the bioregional plan to which the declaration relates; or

(db) in the case of sections 196B, 196C, 196D and 196E—an action that is trading, keeping or moving a member of a listed threatened species or a listed ecological community, if:

(i) when the member of the species or community was taken, the species or community was not a listed threatened species or a listed threatened ecological community, as the case requires; and

(ii) the trading, keeping or moving of the member of the species or community occurs during the period of 6 months that started when the species or community became a listed threatened species or a listed threatened ecological community, as the case requires; or

(e) an action that is taken in a humane manner and is reasonably necessary to relieve or prevent suffering by a member of a listed threatened species or listed threatened ecological community; or

(f) an action that is reasonably necessary to prevent a risk to human health; or

(g) an action by a Commonwealth agency, or an agency of a State or of a self-governing Territory, that is reasonably necessary for the purposes of law enforcement; or

(h) an action that is reasonably necessary to deal with an emergency involving a serious threat to human life or property; or

(i) an action that occurs as a result of an unavoidable accident, other than an accident caused by negligent or reckless behaviour; or

(j) an action that is taken in accordance with a permit issued under regulations made under the *Great Barrier Reef Marine Park Act 1975* and in force; or

(k) an action provided for by, and taken in accordance with, a plan or regime that is accredited under section 208A; or

(l) an action, to the extent that it is covered by subsection 517A(7); or

(m) an action provided for by, and done in accordance with, a conservation agreement in force under Part 14; or

(n) an action taken in a Commonwealth reserve in accordance with a management plan made under Part 15 and in operation for the reserve; or

(o) an action provided for by, and taken in accordance with, a traditional use of marine resources agreement that:

(i) was made and accredited in accordance with regulations made under the *Great Barrier Reef Marine Park Act 1975*; and

(ii) is in force; or

(p) an action that is taken in accordance with a permit that:

(i) was issued under the *Antarctic Treaty (Environment Protection) Act 1980* or under regulations made under that Act; and

(ii) is in force; or

(q) an action that consists of the transit of a member through a Commonwealth area in circumstances where the member was:

(i) obtained from an area that is not a Commonwealth area; or

(ii) taken from a Commonwealth area in circumstances covered by paragraph (a), (c), (d), (da), (db), (j), (k), (m), (n), (o) or (p).

Note: A defendant bears an evidential burden in relation to the matters in this section. See subsection 13.3(3) of the *Criminal Code*.

198 Operation of sections 18 and 18A not affected

To avoid doubt, sections 196, 196A, 196B, 196C, 196D, 196E, 196F and 197 do not affect the operation of section 18 or 18A.

199 Failing to notify taking of listed threatened species or listed ecological community

(1) This section applies to an action taken by a person if all of the following conditions are met:

(a) the person's action either:

(i) results in the death or injury of a member of a listed threatened species (except a conservation dependent species), or a member of a listed threatened ecological community, that is in or on a Commonwealth area; or

(ii) consists of, or involves, trading, taking, keeping or moving a member of a listed threatened species (except a conservation dependent species), or a member of a listed threatened ecological community, that is in or on a Commonwealth area;

(b) the person's action does not constitute an offence against section 196, 196A, 196B, 196C, 196D or 196E, otherwise than because of paragraph 197(db);

(c) the person's action is not an action that the person was authorised by a permit to take.

Note 1: Section 197 sets out most of the circumstances in which an action described in paragraph (1)(a) will not be an offence against section 196, 196A, 196B, 196C, 196D or 196E.

Note 2: A person is authorised by a permit to take an action if the person is the holder of the permit or the person is given an authority under section 204 by the holder of the permit to take the action.

Note 3: The conditions of a permit may require the holder of the permit to give certain notices.

(2) Within 7 days of becoming aware of the action, the person must notify the Secretary in writing, by telephone or by use of any other electronic equipment:

(a) that the action was taken; and

(b) of other particulars (if any) about the action that are prescribed by the regulations.

(3) An example of the particulars about the action that the regulations may prescribe is the time and place of taking the action. This does not limit the particulars the regulations may prescribe.

(4) Subsection (2) does not apply if:

(a) the person, or any other person or body, is required by or under a law of the Commonwealth to notify the Secretary of the action; or

(b) the action is in a class of actions:

(i) that is specified in an agreement or arrangement between the Secretary and a Commonwealth agency, or an agency of a State or self-governing Territory; and

(ii) that the agreement or arrangement provides is to be notified to the Secretary by the agency.

Note: The defendant bears an evidential burden in relation to the matters in this subsection. See subsection 13.3(3) of the *Criminal Code*.

(5) A person commits an offence punishable on conviction by a fine not exceeding 100 penalty units if the person:

(a) fails to do an act; and

(b) the failing to do the act results in a contravention of subsection (2).

Note: Chapter 2 of the *Criminal Code* sets out the general principles of criminal responsibility.

200 Application for permits

(1) A person may, in accordance with the regulations, apply to the Minister for a permit to be issued under section 201.

(2) The application must be accompanied by the fee prescribed by the regulations (if any).

(3) As soon as practicable after receiving the application, the Minister must cause to be published on the internet:

(a) details of the application; and

(b) an invitation for anyone to give the Minister comments within 10 business days (measured in Canberra) on whether the permit should be issued.

Note: If the action is also the subject of a referral under Division 1 of Part 7 and the referral is made at the same time as the application, the application and invitation for comments that must be published under this subsection may be published together with the referral and invitation for comments that must be published under subsection 74(3).

201 Minister may issue permits

(1) Subject to subsections (3) and (3A), the Minister may, on application by a person under section 200, issue a permit to the person.

(2) A permit authorises its holder to take an action specified in the permit without breaching section 196, 196A, 196B, 196C, 196D, 196E or 207B.

(3) The Minister must not issue the permit unless satisfied that:

(a) the specified action will contribute significantly to the conservation of the listed threatened species or listed threatened ecological community concerned; or

(b) the impact of the specified action on a member of the listed threatened species or listed threatened ecological community concerned is incidental to, and not the purpose of, the taking of the action and:

(i) the taking of the action will not adversely affect the survival or recovery in nature of that species or ecological community; and

(ii) the taking of the action is not inconsistent with a recovery plan that is in force for that species or ecological community; and

(iii) the holder of the permit will take all reasonable steps to minimise the impact of the action on that species or ecological community; or

(c) the specified action is of particular significance to indigenous tradition and will not adversely affect the survival or recovery in nature of the listed threatened species or listed threatened ecological community concerned; or

(d) the specified action is necessary in order to control pathogens and is conducted in a way that will, so far as is practicable, keep to a minimum any impact on the listed threatened species or listed threatened ecological community concerned.

(3A) The Minister must, in deciding whether to issue the permit, have regard to any approved conservation advice for the listed threatened species or listed threatened ecological community concerned.

(4) In this Act:

indigenous tradition means the body of traditions, observances, customs and beliefs of indigenous persons generally or of a particular group of indigenous persons.

(5) In making a decision on the application, the Minister must consider the comments (if any) received:

(a) in response to the invitation under subsection 200(3) for anyone to give the Minister comments on whether the permit should be issued; and

(b) within the period specified in the invitation.

202 Conditions of permits

(1) A permit is subject to such conditions as are specified in the permit or as are imposed under subsection (2).

(2) The Minister may, in accordance with the regulations:

(a) vary or revoke a condition of a permit; or

(b) impose further conditions of a permit.

(3) Without limiting subsections (1) and (2), conditions of a permit may include conditions stating the period within which the action specified in the permit may be taken.

203 Contravening conditions of a permit

The holder of a permit commits an offence punishable on conviction by a fine not exceeding 300 penalty units if:

(a) he or she does, or fails to do, an act or thing; and

(b) doing, or failing to do, the act or thing results in a contravention of a condition of the permit.

204 Authorities under permits

(1) Subject to subsection (2), the holder of a permit may give to a person written authority to take for or on behalf of the holder any action authorised by the permit. The authority may be given generally or as otherwise provided by the instrument of authority.

(2) The holder of a permit must not give an authority unless:

(a) the permit contains a condition permitting the holder to do so; and

(b) the authority is given in accordance with any requirements set out in the condition.

(3) A permit is, for the purposes of this Act, taken to authorise the taking of a particular action by a person if the taking of that action by the person is authorised by an authority given by the holder of the permit.

(4) The giving of an authority does not prevent the taking of any action by the holder of the permit.

(5) Except as provided in this section, a permit does not authorise the taking of any action by a person for or on behalf of the holder of the permit.

(6) A person who gives an authority must give to the Minister written notice of it within 14 days after giving the authority.

205 Transfer of permits

On the application, in accordance with the regulations, of the holder of a permit, the Minister may, in accordance with the regulations, transfer the permit to another person.

206 Suspension or cancellation of permits

The Minister may, in accordance with the regulations:

(a) suspend a permit for a specified period; or

(b) cancel a permit.

206A Review of decisions about permits

(1) Subject to subsection (2), an application may be made to the Administrative Appeals Tribunal for review of a decision:

(a) to issue or refuse a permit; or

(b) to specify, vary or revoke a condition of a permit; or

(c) to impose a further condition of a permit; or

(d) to transfer or refuse to transfer a permit; or

(e) to suspend or cancel a permit.

(2) Subsection (1) does not apply to a decision made personally by the Minister (but the subsection does apply to a decision made by a delegate of the Minister).

207 Fees

Such fees as are prescribed (if any) are payable in respect of the following:

(a) the grant or the transfer of a permit;

(b) the variation or revocation of a condition of a permit;

(c) the imposition of a further condition of a permit.

Subdivision BA—Protecting critical habitat

207A Register of critical habitat

(1) The Minister must cause to be kept in accordance with the regulations (if any) a register in which the Minister may list habitat identified by the Minister in accordance with the regulations as being critical to the survival of a listed threatened species or listed threatened ecological community.

(1A) In considering whether to list habitat, the Minister must take into account the potential conservation benefit of listing the habitat.

(1B) Subsection (1) does not limit the matters:

(a) that the Minister may take into account in considering whether to list habitat; or

(b) that the regulations may require or permit the Minister to take into account in considering whether to list habitat.

(2) The regulations must require the Minister to consider scientific advice in identifying the habitat.

(3) The register must be made available for public inspection in accordance with the regulations (if any).

(3A) Particular material included in the register does not have to be made available for public inspection if the Minister considers that the interests of relevant landholders could be impeded or compromised by:

(a) the disclosure of the material; or

(b) without limiting paragraph (a)—the presence or actions of persons if the material were disclosed.

(4) Habitat listed in the register in relation to a species or ecological community is ***critical habitat*** for the species or ecological community.

207B Offence of knowingly damaging critical habitat

(1) A person commits an offence if:

(a) the person takes an action; and

(b) the person knows that the action significantly damages or will significantly damage critical habitat for a listed threatened species (except a conservation dependent species) or of a listed threatened ecological community; and

(c) the habitat is in or on a Commonwealth area.

Note 1: Chapter 2 of the *Criminal Code* sets out the general principles of criminal responsibility.

Note 2: This section does not apply in the circumstances described in section 197. A defendant bears an evidential burden in relation to those circumstances. See subsection 13.3(3) of the *Criminal Code*.

(2) Strict liability applies to paragraph (1)(c).

Note: For ***strict liability***, see section 6.1 of the *Criminal Code*.

(3) The offence is punishable on conviction by imprisonment for not more than 2 years or a fine not exceeding 1,000 penalty units, or both.

(4) To avoid doubt, this section does not affect the operation of Division 2, 3 or 4.

207C Sale or lease of Commonwealth land containing critical habitat

(1) This section applies to a Commonwealth agency that executes a contract for the sale or lease to someone else of Commonwealth land that includes critical habitat for a listed threatened species or listed threatened ecological community. It does not matter whether the Commonwealth agency executes the contract for the Commonwealth or on its own behalf.

(2) The Commonwealth agency must ensure that the contract includes a covenant the effect of which is to protect the critical habitat.

(3) The Commonwealth agency must take reasonable steps to ensure as far as practicable that the covenant binds the successors in title of the buyer or lessee (as appropriate).

Subdivision C—Miscellaneous

208A Minister may accredit plans, regimes or policies

(1) The Minister may, by instrument in writing, accredit for the purposes of this Division:

(a) a plan of management within the meaning of section 17 of the *Fisheries Management Act 1991*; or

(b) a plan of management within the meaning of section 15A of the *Torres Strait Fisheries Act 1984*; or

(c) a plan of management, or a policy, regime or any other arrangement, for a fishery, that is:

(i) made by a State or self-governing Territory; and

(ii) in force under a law of the State or self-governing Territory; or

(d) a regime determined in writing by the Australian Fisheries Management Authority under the *Fisheries Administration Act 1991* for managing a fishery for which a plan of management (within the meaning of section 17 of the *Fisheries Management Act 1991*) is not in force; or

(e) a policy formulated by the Protected Zone Joint Authority under paragraph 34(b) of the *Torres Strait Fisheries Act 1984* for managing a fishery for which a plan of management (within the meaning of section 15A of the *Torres Strait Fisheries Act 1984*) is not in force;

if the Minister is satisfied that:

(f) the plan, regime or policy requires persons engaged in fishing under the plan, regime or policy to take all reasonable steps to ensure that members of listed threatened species (other than conservation dependent species) are not killed or injured as a result of the fishing; and

(g) the fishery to which the plan, regime or policy relates does not, or is not likely to, adversely affect the survival or recovery in nature of the species.

Note 1: The Minister may accredit a plan, regime or policy subject to conditions (see section 303AA).

Note 2: If a plan, regime or policy that is accredited under this section is, or is proposed to be, amended, the Minister may determine under section 303AB that the plan, regime or policy as amended is, for the purposes of this Act, taken to be accredited under subsection (1) of this section.

(2) An instrument under subsection (1) is not a legislative instrument.

208 Regulations

The regulations may:

(a) provide for the transportation, treatment and disposal of members of listed threatened species or listed threatened ecological communities killed, injured or taken in contravention of this Division; and

(b) provide for the methods or equipment by which members of listed threatened species or listed threatened ecological communities may be killed or taken otherwise than in contravention of this Division; and

(c) provide for the gathering and dissemination of information relating to listed threatened species or listed threatened ecological communities; and

(d) provide for the protection and conservation of listed threatened species or listed threatened ecological communities; and

(e) provide for any matter incidental to or connected with any of the above paragraphs.

266B Approved conservation advice for listed threatened species and listed threatened ecological communities

Minister to ensure there is approved conservation advice

(1) The Minister must ensure that there is approved conservation advice for each listed threatened species (except one that is extinct or that is a conservation dependent species), and each listed threatened ecological community, at all times while the species or community continues to be listed.

(2) For this purpose, ***approved conservation advice*** is a document, approved in writing by the Minister (and as changed from time to time in accordance with subsection (3)), that contains:

(a) a statement that sets out:

(i) the grounds on which the species or community is eligible to be included in the category in which it is listed; and

(ii) the main factors that are the cause of it being so eligible; and

(b) either:

(i) information about what could appropriately be done to stop the decline of, or support the recovery of, the species or community; or

(ii) a statement to the effect that there is nothing that could appropriately be done to stop the decline of, or support the recovery of, the species or community.

Changing approved conservation advice

(3) The Minister may, in writing, approve changes to approved conservation advice.

Consultation with Scientific Committee

(4) If the Minister proposes to approve a document as approved conservation advice, the Minister must consult the Scientific Committee about the document, unless its content is substantially the same as material that the Committee has previously provided to the Minister.

(5) If the Minister proposes to approve a change to approved conservation advice, the Minister must consult the Scientific Committee about the change, unless the change is substantially the same as a change that the Scientific Committee has previously advised the Minister should be made.

Publication requirements

(6) If the Minister approves a document as approved conservation advice, the Minister must:

(a) within 10 days of the approval of the document, publish the approved conservation advice on the internet; and

(b) comply with any other publication requirements of the regulations.

(7) If the Minister approves a change to approved conservation advice, the Minister must:

(a) within 10 days of the approval of the change, publish the advice, as changed, on the internet; and

(b) comply with any other publication requirements of the regulations.

Instruments of approval are not legislative instruments

(8) An instrument of approval under subsection (2) or (3) is not a legislative instrument.

PRIORITY ECOLOGICAL COMMUNITIES FOR WESTERN AUSTRALIA VERSION 32

Species and Communities Program, Department of Biodiversity, Conservation and Attractions
15 July 2021

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the priority ecological community list under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as threatened ecological communities. Ecological communities that are adequately known and are rare but not threatened or meet criteria for near threatened, or that have been recently removed from the threatened list, are placed in priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in priority 5.
Note:
i) Nothing in this table may be construed as a nomination for listing under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
ii) The inclusion in this table of a community type does not necessarily imply any status as a threatened ecological community, however some communities are listed as threatened ecological communties (TECs) under the EPBC Act (see column D).
iii) The key diagnostic characteristics, condition and size thresholds in the Approved Conservation Advices should be applied to determine if particular areas align with EPBC listed TECs.
iii) Regions eg Pilbara, are based on Department of Biodiversity, Conservation and Attraction regional boundaries.
iv) For definitions of categories (Priority 1 etc.) refer to document entitled 'Definitions and Categories'.

	Community name	Category (WA)	Category EPBC Act
	PILBARA		
1	**West Angelas Cracking-Clays** Open tussock grasslands of *Astrebla pectinata, A. elymoides, Aristida latifolia*, in combination with low scattered shrubs of *Sida fibulifera,* on basalt (Jerrinah formation) derived cracking-clay loam depressions and flowlines. Occurs throughout the central and eastern Hamersley Range from near Tom Price east to Newman. Threats: disturbance footprints increasing from mining and infrastructure, possible weed invasion, fragmentation and altered fire regimes.	Priority 1	
2	**Weeli Wolli Spring community** Weeli Wolli Spring's riparian woodland and forest associations are unusual as a consequence of composition of the understorey. The sedge and herbfield communities that fringe many of the pools and associated water bodies along the main channels of Weeli Wolli Creek have not been recorded from any other wetland site in the Pilbara. The spring and creekline are also noted for their relatively high diversity of stygofauna and this is probably attributed to the large-scale calcrete and alluvial aquifer system associated with the creek. The valley of Weeli Wolli Spring also supports a very rich microbat assemblage including a threatened species. Threats: dewatering and re-watering altering patterns of inundation, weed invasion, increased visitation.	Priority 1	
3	**Burrup Peninsula rock pool communities** Calcareous tufa deposits. Interesting aquatic snails. Threats: recreational impacts, and potential development; possibly NOX and SOX emissions.	Priority 1	
4	**Burrup Peninsula rock pile communities** Pockets of vegetation in rock piles, rock pockets and outcrops of Gidley granophyre, restricted to Burrup Peninsula and some Dampier Archipelago islands. Comprise a mixture of Pilbara and Kimberley fire sensitive species. Communities are different from those of the Hamersley and Chichester Ranges. Short-range endemic land snails. Threats: clearing, altered fire regimes, emissions, weed invasion (*Cenchrus ciliaris* (buffel grass), *Passiflora foetida* (stinking passionflower)*, Aerva javanica* (kapok)).	Priority 1	
5	**Roebourne Plains coastal grasslands with gilgai microrelief on cracking clays** (Roebourne Plains gilgai grasslands) These grasslands occur on microrelief on strongly gilgaied self-mulching cracking clays, and emergent depositional surfaces. The grasslands are surrounded by clay plains/flats and sandy coastal and alluvial plains. The gilgai depressions supports ephemeral and perennial tussock grasslands dominated by *Sorghum* sp.and *Eragrostis xerophila* (Roebourne Plains grass) along with other native species including *Astrebla pectinata* (barley mitchell grass), *Eriachne benthamii* (swamp wanderrie grass), *Chrysopogon fallax* (golden beard grass) and *Panicum decompositum* (native millet). Restricted to the Karratha area, where it has been largely removed. This community differs from the surrounding clay flats of the Horseflat land system which are dominated by *Eragrostis xerophila* and other perennial tussock grass species (*Eragrostis* mostly). This community incorporates Unit 3 (gilgaied plains) of the Horseflat land system as described in van Vreeswyk, A M, Leighton, K A, Payne, A L, and Hennig, P. (2004), *An inventory and condition survey of the Pilbara region, Western Australia*. Department of Agriculture and Food, Western Australia, Perth. Technical Bulletin 92. Threats: grazing, clearing for mining and infrastructure and urban development, weed invasion, basic raw material extraction.	Priority 1	

72	***Granite outcrop pools with endemic aquatic fauna** Freshwater pools formed on granite outcrops that may persist for several months and house a variety of aquatic invertebrates, some of which are endemic to south-west WA. Some examples include cladocerans, ostracods, copepods, rotifers, oligochaetes and molluscs.	Priority 3(i)	
73	***Banksia woodlands of the Swan Coastal Plain** Canopy is most commonly dominated or co-dominated by *Banksia attenuata* and/or *B. menziesii*. Other Banksia species that can dominate in the community are *B. prionotes* or *B.ilicifolia*. It typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands; it is also common on sandy colluvium and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau and, in other less common scenarios. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.	Priority 3(iii)	Endangered TEC
74	***Posidonia australis* complex seagrass meadows** The community consists of the assemblage of plants, animals and micro-organisms associated with seagrass meadows dominated by species from the *Posidonia australis* complex. It occurs as continuous to patchy monospecific and multispecies seagrass meadows dominated by species from the *Posidonia australis* complex - *P. angustifolia, P. australis* and *P. sinuosa*. It is the climax community of a successional process that occurs over decades to centuries. The community is distributed in temperate Australian waters between Shark Bay (25°S) on the west coast, across southern Australia to Wallis Lake (32°S) on the east coast, around Bass Strait islands and along the north coast of Tasmania. Threats: decline in water quality, coastal infrastructure development and damage caused by vessels and moorings. Climate change is anticipated to significantly impact on seagrasses over time due to their particular sensitivity to changes in factors such as temperature, salinity, water clarity, pH and sea level.	Priority 3(i)	
75	***Eucalypt woodlands of the Western Australian Wheatbelt** (synonymous with the Eucalypt woodlands of the Western Australian Wheatbelt EPBC-listed TEC)	Priority 3(iii)	Critically Endangered TEC
	The community occurs in the IBRA Avon Wheatbelt 1 and 2 and Western Mallee subregions. It also inlcudes outlying patches in the eastern parts of JAF01 Northern Jarrah Forests and JAF02 Jarrah Forests adjacent to the Avon Wheatbelt, that are off the Darling Range, and receive less than 600 mm mean annual rainfall. The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature woodland is 10%. The key dominant or co-dominant species of the tree canopy are species of Eucalyptus trees that typically have a single trunk. Native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community. Threats: altered hydrology, grazing, altered fire regimes, vegetation clearing, exotic species, soil cultivation and fertilization		
76	***Subtropical and Temperate Coastal Saltmarsh** (synonymous with the Subtropical and Temperate Coastal Saltmarsh EPBC-listed TEC) Consists of the assemblage of plants, animals and micro-organisms associated with saltmarsh in coastal regions of sub-tropical and temperate Australia (south of 23ºS latitude). It occurs on the coastal margin, along estuaries and coastal embayments and on low wave energy coast in places with at least some tidal connection, including rarely-inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences. The community occurs on sandy or muddy substrate and may include coastal clay pans and similar habitats. It consists of dense to patchy areas of characteristic coastal saltmarsh plant species that include salt- tolerant herbs, succulent shrubs or grasses, and may also include bare sediment as part of the mosaic. It can occur where the proportional cover by tree canopy such as mangroves, *Melaleucas* or *Casuarinas* or seagrass is not greater than 50%. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.	Priority 3(iii)	Vulnerable TEC
77	**Austin Land System** Saline stony plains with low rises and drainage foci supporting low halophytic shrublands with scattered mulga; occurs mainly adjacent to lakes Austin and Annean below greenstone hill systems.	Priority 3(iii)	
78	***Barrabiddy Land System** Flood plains and broad drainage zones with shallow channelling, supporting tall acacia shrublands with some saltbush and tussock grasses. Bluebush/salt bush shrublands largely lost. Threats: over grazing, weed invasion (buffel grass)	Priority 3(iii)	
79	***Bibbigunna Land System** Clay flats with crabholes and sluggish drainage; chenopod and tussock grass pastures. Characterised by heavy clay drainage swamps marked by finely etched meandering drainage typical of flat plains. Very slightly higher pebble strewn areas may occur within the swamps, but they are never very significant. Threats: over grazing	Priority 3(iii)	

Department of Environment and Conservation
January 2013

DEFINITIONS, CATEGORIES AND CRITERIA FOR THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

1. GENERAL DEFINITIONS

Ecological Community
A naturally occurring biological assemblage that occurs in a particular type of habitat.

Note: The scale at which ecological communities are defined will often depend on the level of detail in the information source, therefore no particular scale is specified.

A **threatened ecological community** (TEC) is one which is found to fit into one of the following categories; “presumed totally destroyed”, “critically endangered”, “endangered” or “vulnerable”.

Possible threatened ecological communities that do not meet survey criteria are added to DEC’s Priority Ecological Community Lists under Priorities 1, 2 and 3. Ecological Communities that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

An **assemblage** is a defined group of biological entities.

Habitat is defined as the areas in which an organism and/or assemblage of organisms lives. It includes the abiotic factors (eg. substrate and topography), and the biotic factors.

Occurrence: a discrete example of an ecological community, separated from other examples of the same community by more than 20 metres of a different ecological community, an artificial surface or a totally destroyed community.

By ensuring that every discrete occurrence is recognised and recorded future changes in status can be readily monitored.

Adequately Surveyed is defined as follows:
“An ecological community that has been searched for thoroughly in most likely habitats, by relevant experts.”

Community structure is defined as follows:
“The spatial organisation, construction and arrangement of the biological elements comprising a biological assemblage” (eg. *Eucalyptus salmonophloia* woodland over scattered small shrubs over dense herbs; structure in a faunal assemblage could refer to trophic structure, eg. dominance by feeders on detritus as distinct from feeders on live plants).

Definitions of Modification and Destruction of an ecological community:

Modification: “changes to some or all of ecological processes (including abiotic processes such as hydrology), species composition and community structure as a

direct or indirect result of human activities. The level of damage involved could be ameliorated naturally or by human intervention."

Destruction: "modification such that reestablishment of ecological processes, species composition and community structure within the range of variability exhibited by the original community is unlikely within the foreseeable future even with positive human intervention."

Note: Modification and destruction are difficult concepts to quantify, and their application will be determined by scientific judgement. Examples of modification and total destruction are cited below:

Modification of ecological processes: The hydrology of Toolibin Lake has been altered by clearing of the catchment such that death of some of the original flora has occurred due to dependence on fresh water. The system may be bought back to a semblance of the original state by redirecting saline runoff and pumping waters of the rising watertable away to restore the hydrological balance. Total destruction of downstream lakes has occurred due to hydrology being altered to the point that few of the original flora or fauna species are able to tolerate the level of salinity and/or water logging.

Modification of structure: The understorey of a plant community may be altered by weed invasion due to nutrient enrichment by addition of fertiliser. Should the additional nutrients be removed from the system the balance may be restored, and the original plant species better able to compete. Total destruction may occur if additional nutrients continue to be added to the system causing the understorey to be completely replaced by weed species, and death of overstorey species due to inability to tolerate high nutrient levels.

Modification of species composition: Pollution may cause alteration of the invertebrate species present in a freshwater lake. Removal of pollutants may allow the return of the original inhabitant species. Addition of residual highly toxic substances may cause permanent changes to water quality, and total destruction of the community.

Threatening processes are defined as follows:
"Any process or activity that threatens to destroy or significantly modify the ecological community and/or affect the continuing evolutionary processes within any ecological community."

Examples of some of the continuing threatening processes in Western Australia include: general pollution; competition, predation and change induced in ecological communities as a result of introduced animals; competition and displacement of native plants by introduced species; hydrological changes; inappropriate fire regimes; diseases resulting from introduced microorganisms; direct human exploitation and disturbance of ecological communities.

Restoration is defined as returning an ecological community to its pre-disturbance or natural state in terms of abiotic conditions, community structure and species composition.

Rehabilitation is defined as the re-establishment of ecological attributes in a damaged ecological community although the community will remain modified.

2. DEFINITIONS AND CRITERIA FOR PRESUMED TOTALLY DESTROYED, CRITICALLY ENDANGERED, ENDANGERED AND VULNERABLE ECOLOGICAL COMMUNITIES

Presumed Totally Destroyed (PD)
An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.

An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant **and either** of the following applies (A or B):

A) Records within the last 50 years have not been confirmed despite thorough searches of known or likely habitats **or**

B) All occurrences recorded within the last 50 years have since been destroyed

Critically Endangered (CR)
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.

An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting **any one or more of** the following criteria (A, B or C):

A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% **and either or both** of the following apply (i or ii):

i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 10 years);

ii) modification throughout its range is continuing such that in the immediate future (within approximately 10 years) the community is unlikely to be capable of being substantially rehabilitated.

B) Current distribution is limited, **and one or more** of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 10 years);

ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes;

iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes.

C) The ecological community exists only as highly modified occurrences that may be capable of being rehabilitated if such work begins in the immediate future (within approximately 10 years).

Endangered (EN)
An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.

An ecological community will be listed as **Endangered** when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information by it meeting **any one or more of** the following criteria (A, B, or C):

A) The geographic range, and/or total area occupied, and/or number of discrete occurrences have been reduced by at least 70% since European settlement **and either or both** of the following apply (i or ii):

i) the estimated geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term future (within approximately 20 years);

ii) modification throughout its range is continuing such that in the short term future (within approximately 20 years) the community is unlikely to be capable of being substantially restored or rehabilitated.

B) Current distribution is limited, **and one or more** of the following apply (i, ii or iii):

i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 20 years);

ii) there are few occurrences, each of which is small and/or isolated and all or most occurrences are very vulnerable to known threatening processes;

iii) there may be many occurrences but total area is small and all or most occurrences are small and/or isolated and very vulnerable to known threatening processes.

C) The ecological community exists only as very modified occurrences that may be capable of being substantially restored or rehabilitated if such work begins in the short-term future (within approximately 20 years).

Vulnerable (VU)
An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

An ecological community will be listed as **Vulnerable** when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium (within approximately 50 years) to long-term future. This will be determined on the basis of the best available information by it meeting **any one or more of** the following criteria (A, B or C):

A) The ecological community exists largely as modified occurrences that are likely to be capable of being substantially restored or rehabilitated.

B) The ecological community may already be modified and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations.

C) The ecological community may be still widespread but is believed likely to move into a category of higher threat in the medium to long-term future because of existing or impending threatening processes.

3. DEFINITIONS AND CRITERIA FOR PRIORITY ECOLOGICAL COMMUNITIES

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community. Ecological communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

Priority One: Poorly-known ecological communities

Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤ 100ha). Occurrences are believed to be under threat either due to limited extent, or being on lands under immediate threat (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) or for which current threats exist. May include communities with occurrences on protected lands. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.

Priority Two: Poorly-known ecological communities

Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.

Priority Three: Poorly known ecological communities

(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:
(ii) communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or;
(iii) communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.

Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

Priority Four: Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.

(i) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands.

(ii) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for a higher threat category.

(iii) Ecological communities that have been removed from the list of threatened communities during the past five years.

Priority Five: Conservation Dependent ecological communities

Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

JURISDICTION	**:**	STATE ADMINISTRATIVE TRIBUNAL
ACT	**:**	PLANNING AND DEVELOPMENT ACT 2005 (WA)
CITATION	**:**	CARBONE BROS PTY LTD and SHIRE OF HARVEY [2021] WASAT 150
MEMBER	**:**	MS C BARTON, MEMBER MR R POVEY, MEMBER MR P CURRY, SENIOR SESSIONAL MEMBER
HEARD	**:**	14, 15 AND 16 JUNE 2021 (FINAL SUBMISSIONS FILED ON 3 SEPTEMBER 2021)
DELIVERED	**:**	26 NOVEMBER 2021
FILE NO/S	**:**	DR 77 of 2020
BETWEEN	**:**	CARBONE BROS PTY LTD Applicant AND SHIRE OF HARVEY Respondent

Catchwords:

Town planning - Development application - Exercise of planning discretion - Orderly and proper planning - Extractive industry - State and regionally significant resource - Extraction of basic raw materials - Native vegetation - Tuart woodlands - Condition requiring retention of trees - Whether resource sterilised - Whether sustainable use and development of land - Whether breeding and roosting habitat for Black-Cockatoos - Whether trees part of threatened ecological community - Whether acceptable environmental standards - Connectivity of remnant vegetation - Patch - Approved conservation advice -

Mine site rehabilitation - Mine restoration - Biodiversity offsets - Clearing permit application - Preliminary departmental assessment - Clearing principles

Legislation:

Biodiversity Conservation Act 2016 (WA)
Environment Protection and Biodiversity Conservation Act 1999 (Cth), s 18A, 181, s 182, s 253, s 528
Environmental Protection Act 1986 (WA), Pt IV, Pt V, s 51E(1), s 51T, Sch 5
Evidence Act 1906 (WA)
Planning and Development (Local Planning Schemes) Regulations 2015 (WA), Sch 2, cl 67(2), cl 67(2)(b), cl 90(2)
Planning and Development Act 2005 (WA), s 3(1)(c), s 241(1)(a), s 252(1)
State Administrative Tribunal Act 2004 (WA), s 17, s 18, s 24, s 27, s 27(1), s 29(3), s 31, s 32(1), s 32(2)(a), s 32(2)(b)

Result:

Application dismissed

Category: B

Representation:

Counsel:

Applicant	:	Mr J Skinner
Respondent	:	Mr CA Slarke

Solicitors:

Applicant	:	Thomson Geer - Perth
Respondent	:	McLeods

Case(s) referred to in decision(s):

Empire Securities Pty Ltd & Ors and Western Australian Planning Commission [2005] WASAT 98
Koltasz Smith & Partners v Western Australian Planning Commission (2000) SR (WA) 266
Marshall v Metropolitan Redevelopment Authority [2015] WASC 226

Mount Lawley Pty Ltd and Western Australian Planning Commission [2007] WASAT 59

Robertson and City of Albany [2019] WASAT 3

SITA Australia Pty Ltd and Wheatbelt Joint Development Assessment Panel [2016] WASAT 22

SITA Australia Pty Ltd v Greater Dandenong City Council [2007] VCAT 156; (2007) 150 LGERA 266

Telstra Corporation Limited v Hornsby Shire Council [2006] NSWLEC 133; (2006) 146 LGERA 10; (2006) 67 NSWLR 256

REASONS FOR DECISION OF THE TRIBUNAL:

Introduction

1 In October 2019, Carbone Bros Pty Ltd (**applicant**) applied to the Shire of Harvey (**Shire**) for development approval under the Shire's *District Planning Scheme No 1* (**DPS 1**) and the *Greater Bunbury Region Scheme* (**GBRS**) to carry out an extractive industry over part of Lot 29 Tredrea Place, Myalup (**subject land** or **site**) not previously approved for that purpose.[1] The Council of the Shire approved the application on 24 March 2020 subject to conditions.

2 On 22 April 2020, the applicant commenced proceedings in the Tribunal seeking review of the Shire's approval under s 252(1) of the *Planning and Development Act 2005* (WA) (**PD Act**) in respect of conditions 2, 3, 4, 5, 9 and 11.

3 On 29 October 2020, following mediation, the Shire reconsidered its decision under s 31 of the *State Administrative Tribunal Act 2004* (WA) (**SAT Act**) (**development approval**). The development approval is satisfactory to the applicant other than condition 3 and condition 9, which provide:[2]

> 3. Prior to the issue of an Extractive Industry Licence, the Applicant shall submit an amended proposal for approval by the Shire that addresses:
>
> a. the proposed extraction area being modified to ensure the retention and protection of the 'Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain Ecological Community', which includes the six Tuarts initially proposed to be cleared, with a buffer of at least 30m from the outer edge of the canopies; and
>
> b. updated proposal details including:
>
> i. total area to be extracted;
>
> ii. total volume of limestone to be extracted; and
>
> iii. staging and extraction timeframe.

[1] The application under DPS1 was made on 9 October 2019, while the application under the GBRS was made on 15 October 2019. Exhibit 2, pages 27-29.
[2] Exhibit 1, para 9; Exhibit 9, para 2; Exhibit 2, pages 147-151.

…

9. Prior to the issue of an Extractive Industry Licence, a suitable demarcation barrier shall be erected 30m from the outer edge of the canopies of the Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain Ecological Community as shown on the approved plan, to the satisfaction of the Shire.

4 The applicant is seeking orders from the Tribunal varying the development approval by deleting condition 3. Should the application for review be allowed, the applicant accepts that condition 9 could be accommodated in respect of the remaining Tuart woodland by an amendment to the approved plan.[3]

5 For the reasons set out in this decision, the Tribunal finds that the application, the subject of review, should be dismissed. The Tribunal will affirm the Shire's decision made on 29 October 2020.

The proposal

6 The applicant proposes to carry out an extractive industry (limestone extraction) over a part of the subject land not previously approved for that purpose.

7 The proposal involves:[4]

a) the extraction of limestone from a new 8.3 hectare area of the subject land, together with limestone from the batter created by previous limestone extraction;

b) the removal of a total estimated volume of 520,452.93 cubic metres of limestone (including from the batter);

c) the extraction of limestone in four equal stages of approximately 2.1 hectares as shown on the plan of the proposed operations in Annexure A to this decision. The first two stages will take place over a period of 10 years;

d) approval for the extraction of limestone from stages 1 and 2 only, plus extraction from the existing batter;

[3] Applicant's Statement of Issues Facts and Contentions (**SIFC**), (Exhibit 9), para 15.
[4] See *Extractive Industries Licence Application and Environmental Management Plan, Lot 29 Tredrea Place, Myalup*, prepared by Lundstom Environmental Consultants Pty Ltd, October 2019, p. 6.

e) approval to clear six Tuart trees located in the future extraction area, identified as stages 3 and 4; and

f) progressive rehabilitation of the subject land to native vegetation and pasture.

Subject land and the locality

8 The subject land:

a) has an area of approximately 40 hectares;

b) contains an area of approximately 9.2 hectares from which limestone has been extracted over a period of approximately 25 years;

c) contains a multiple use wetland in the western portion of the site;

d) contains six *Eucalyptus gomphocephala* trees (**Tuart trees**) which the applicant seeks approval to remove to facilitate future limestone extraction (in stages 3 and 4);

e) has native vegetation in the northern part of the site, which includes Tuart woodland, along with some *Agonis flexuosa* (Peppermint), *Eucalyptus marginata* (Jarrah) and *Corymbia calophylla* (Marri). The Tuart woodland, to the north-east of the Tuart trees, forms a 'patch' of the Tuart Threatened Ecological Community (**Tuart TEC**). As the total area of the 'patch' is greater than 5 hectares, it is part of the nationally protected ecological community;[5]

f) is otherwise cleared of vegetation, save for remnant vegetation along the western boundary with the multiple use wetland and the Tuart TEC and other remnant vegetation in the northern part of the subject land.

g) is zoned 'General Farming' pursuant to DPS 1;

[5] An 'ecological community' is the extent in nature of an assemblage of native species that inhabits a particular area: see *Environment Protection and Biodiversity Conservation Act 1999* (Cth), s 528.

h) is within a Place of Landscape Value designated by DPS 1;

i) is zoned 'Rural' pursuant to the GBRS;

j) is identified in the GBRS *Strategic Minerals and Basic Raw Materials Resource Policy* (**SMBRM Policy**) as being within an area of Significant Geological Supplies for Limestone; and

k) is adjacent to existing and approved sand extraction activities and operations on land to the north, south and east.

9 Land uses surrounding the subject land include rural and extraction activities. To the west of the subject land is a natural dune and foreshore area and the Indian Ocean. To the southeast of the subject land (on Toranto Road) is the Binningup Desalination Plant. Several other large Tuart trees are located on the subject land and adjacent to Toranto Road, to the south of the subject land.[6]

Tuart woodlands as a Threatened Ecological Community

10 The Tuart woodlands and forests of the Swan Coastal Plain ecological community has been listed as a threatened ecological community in the category 'critically endangered' under s 181 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth), (**EPBC Act**).[7] An ecological community is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.[8]

11 The Federal Minister for the Environment must ensure that an approved conservation advice is in place for each listed threatened ecological community which sets out the grounds on which the community is eligible to be included in the category in which it is listed and the main factors that are the cause of it being so eligible.[9]

12 The approved conservation advice for the Tuart woodlands and forests of the Swan Coastal Plain ecological community (**Conservation**

[6] Exhibit 19 – bundle of photographs, pages 2-3.
[7] Exhibit 2, pages 342-345.
[8] EPBC Act, s 182.
[9] EPBC Act , s 266B.

Advice)[10] incorporates recommended conservation actions to stop the decline of or support the recovery of the community. The highest priority action for protecting the Tuart woodlands and forests of the Swan Coastal Plain ecological community, which includes the Tuart TEC, is to:[11]

> [p]revent further clearance, fragmentation, or detrimental modification of remnants of the ecological community and of surrounding native vegetation, for example, during residential development. The higher condition patches, and older growth areas are particularly important for retention and management.

13 The Conservation Advice also provides, among other things:

a) that the ecological community 'must meet the diagnostic characteristics and at least the minimum condition thresholds for national protection',[12] including:[13]

…

- Other tree species may be present in the canopy or sub-canopy. They commonly include: *Agonis flexuosa* (Peppermint) and *Banksia grandis* (Bull Banksia) (both in the southern part of the range), *Banksia attenuata* (Candlestick Banksia), *Eucalyptus marginata* (Jarrah); and less commonly, *Corymbia calophylla* (Marri), *Banksia menziesii* (Firewood Banksia) and *Banksia prionotes* (Acorn Banksia).

- An understorey of native plants is typically present, which may include grasses, herbs and shrubs, although this is often modified by disturbance. Some understorey plant species that are most commonly present are listed in Section 2.3.3[.]

b) '… that patches of an ecological community can differ in their quality, with some patches having undergone substantial degradation';[14] and

c) that: [15]

> **All patches of 5 ha or greater** that meet the key diagnostic characteristics **are part of the nationally**

[10] Exhibit 2, pages 154-311.
[11] Exhibit 2, page 197.
[12] Exhibit 2, page 171; Conservation Advice, s 3.1.
[13] Exhibit 2, pages 173-174; Conservation Advice, s 3.2.1.
[14] Exhibit 2, page 171; Conservation Advice, s 3.1.
[15] Exhibit 2, page 177; Conservation Advice, s 3.3.

> **protected ecological community**. It is not necessary to conduct additional surveys to confirm that they meet biotic condition thresholds (Table 2) and that they are protected. However more detailed survey may assist in environment impact assessment, planning and monitoring management, or in determining relative biodiversity value between and within different large patches (e.g. to be used in prioritising conservation works etc.). Patches of this size that meet the key diagnostic characteristics provide important contributions to local biodiversity, habitat features and contribute to ecological connectivity of the ecological community and other surrounding ecological communities. Larger patches are likely to be more resilient to some kinds of disturbance and native species loss associated with fragmentation. These characteristics are all important for the long term resilience of the ecological community across its range.

The Tribunal's review jurisdiction

14 By reason of s 17 of the SAT Act, the application falls within the Tribunal's review jurisdiction. In exercising the Tribunal's review jurisdiction, the Tribunal is to deal with a matter in accordance with the SAT Act and the PD Act (referred to as the 'enabling Act' for the purposes of the Tribunal's review jurisdiction, which may modify the operation of the SAT Act in relation to the matter).[16]

15 Where a condition is the subject of the application for review, as is the case in this proceeding, the Tribunal will not generally embark on a review of the Shire's decision to approve the proposal.[17] The Tribunal's review of the conditions imposed by the Shire is by way of a hearing de novo for the purposes of producing the correct and preferable decision on the basis of the information and evidence before it.[18]

16 The Tribunal is not bound to apply the *Evidence Act 1906* (WA), the rules of evidence, or any practices and procedures of courts of record[19] but is bound by the rules of natural justice unless authorised expressly or by implication to depart from those rules by the SAT Act or the enabling Act.[20]

[16] Section 18, SAT Act.
[17] ***Empire Securities Pty Ltd & Ors and Western Australian Planning Commission*** [2005] WASAT 98 at [10]; ***Koltasz Smith & Partners v Western Australian Planning Commission*** (2000) SR (WA) 266 at 274.
[18] Section 27, SAT Act.
[19] Section 32(2)(a), SAT Act.
[20] Section 32(1), SAT Act.

17 The Tribunal is not limited to the material before the Shire as the original decision-maker but may consider new material.[21] The Tribunal is to act according to equity, good conscience and the substantial merits of the case without regard to technicalities.[22] Section 29(3) of the SAT Act confers specific power on the Tribunal to make any order that it considers appropriate, including an order to set aside the original decision, affirm that decision or vary that decision.

Issues for determination

18 The Shire identified the following issue for determination by the Tribunal (**primary issue**):

> 1) Should condition 3 and condition 9 of the development approval be maintained?

19 The applicant agreed with the primary issue for determination and accepts that if the Tribunal finds that condition 3 should be deleted, condition 9 could be maintained to provide a 30 metre demarcation barrier in respect of the remaining Tuart woodland.[23]

20 With the benefit of the parties' contentions and expert evidence, we have identified the following issues that are relevant to our determination of the primary issue:

> 1) What impact would clearing the Tuart trees have on Black-Cockatoo foraging and breeding habitat?
>
> 2) Do the Tuart trees form part of the Tuart TEC?
>
> 3) Would clearing the Tuart trees have a significant impact on the Tuart TEC?
>
> 4) Would clearing the Tuart trees be consistent with the aims and provisions of DPS 1?
>
> 5) Would clearing the Tuart trees be environmentally acceptable having regard to the planning framework for extractive industry?

[21] Section 27(1), SAT Act.
[22] Section 32(2)(b), SAT Act.
[23] ts 8, 14 June 2021.

6) Would clearing the Tuart Trees be consistent with orderly and proper planning?

The conduct of the hearing and expert evidence

21 Each party filed with the Tribunal and gave to the other party a statement of issues, facts and contentions. On 20 November 2020, the Shire filed a bundle of documents under s 24 of the SAT Act. The Shire filed a supplementary bundle of documents on 13 January 2021.

22 The applicant relied on the evidence of Mr Greg Harewood who has over 30 years' experience working as an environmental scientist, zoologist and geologist. Mr Harewood was engaged by the applicant to carry out a Black-Cockatoo habitat tree assessment in respect of the Tuart trees and identify likely direct impacts of clearing on the Black-Cockatoo (**Habitat assessment report**).[24] Mr Harewood prepared a witness statement dated 15 January 2021. The Shire relied on the evidence of Dr Michael Bamford who is a principal of Bamford Consulting Ecologists and provides specialist services for environmental impact assessment and monitoring. Dr Bamford prepared a witness statement dated 15 January 2021 in relation to the conservation significance of the Black-Cockatoo and the potential impact on its foraging and breeding habitat, and its roosting sites, from the removal of the Tuart trees.

23 Following expert conferral, Dr Bamford and Mr Harewood prepared a joint witness statement dated 25 January 2021.

24 The applicant also relied on the evidence of Mr Michael Lundstrom who is the director of Lundstrom Environmental Consultants Pty Ltd and has over 24 years' experience as an environmental consultant. Mr Lundstrom was engaged by the applicant to assess whether the clearing of the Tuart trees would have a significant environmental impact on the Tuart TEC. Mr Lundstrom's findings are contained in his witness statement dated 18 January 2021. The Shire engaged Prof Kingsley Dixon to undertake an assessment of the significance of the Tuart TEC and whether the Tuart trees form part of the Tuart TEC. Prof Dixon currently serves as John Curtin Distinguished Professor in Plant Sciences and Director, ARC Centres for Mine Restoration, at Curtin University. During his career, Prof Dixon has specialised in the ecology, restoration and conservation biology of Australian native plants and ecosystems.

[24] *Black-Cockatoo Habitat Tree Assessment - CPS 8618/1 - Lot 29 Tredea Road, Myalup* (November 2019).

25 Prof Dixon prepared a witness statement dated 15 January 2021, a supplementary witness statement dated 4 February 2021 and, following expert conferral, a joint witness statement with Mr Lundstrom dated 27 January 2021. Under cross-examination, Mr Lundstrom acknowledged that he is not a botanist and that he would defer to Prof Dixon's expertise in respect of Tuart trees.[25] Prof Dixon is a member of the Federal Threatened Species Scientific Committee which was involved in the listing of the Tuart woodland and forests as a threatened ecological community.[26] For these reasons, to the extent that there are differences of opinion between the experts in relation to the ecological significance of the Tuart trees, we prefer the evidence of Prof Dixon to that of Mr Lundstrom.

26 Mr Stephen Allerding, a town planner and Director of Allerding & Associates, prepared a witness statement dated 18 January 2021, and a supplementary witness statement dated 24 February 2021. Mr Allerding was retained by the applicant to provide an independent planning assessment of the proposal that is the subject of the review application. The Shire relied on the evidence of Mr Simon Hall, who holds the position of Director Sustainable Development at the Shire. Mr Hall, who is a qualified planner, prepared a witness statement dated 18 January 2021 and a supplementary witness statement dated 21 April 2021.

27 The applicant also relied on the evidence of Mr Darren Noble, who is managing director of Noble Consulting Surveyors Pty Ltd and a land surveying consultant. Mr Noble was engaged by the applicant to determine the volume of limestone material that would be sterilised if the Tuart trees were retained. Mr Noble prepared a witness statement dated 18 January 2021 and a supplementary witness statement dated 31 May 2021.

28 The proceedings were heard on 14, 15 and 16 June 2021 with the parties and all expert witnesses attending the Tribunal in person. The Tribunal had the benefit of a site view on 14 June 2021 during which it had the opportunity to observe the six Tuart trees and the Tuart woodland located on the northern boundary of the subject land.

29 On 13 August 2021, the parties filed written submissions in response to an invitation by the Tribunal to comment on the effect of the gazettal on 16 July 2021 of *State Planning Policy 2.4 - Planning for Basic Raw Materials* (**SPP 2.4**) on the determination of the issue in the

[25] ts 97, 15 June 2021.
[26] ts 97, 15 June 2021.

proceedings. The parties' written submissions in reply were filed on 20 August 2021, with further written submissions filed by the Shire on 24 August 2021 and by the applicant on 3 September 2021. The Tribunal's decision was reserved from the date of filing of the last submission.

The planning framework

30 The relevant planning framework, which we have considered in determining the application includes the following:

1) *Planning and Development (Local Planning Schemes) Regulations 2015* (WA) (**LPS Regulations**)

2) GBRS

3) DPS 1

4) SMBRM Policy

5) State Planning Policy 1 - State Planning Framework (**SPP 1.0**)

6) State Planning Policy 2 - Environment and Natural Resources Policy (**SPP 2.0**)

7) SPP 2.4

8) State Planning Policy 2.5 - Rural Planning (**SPP 2.5**)

9) State Planning Policy 2.4 Planning for Basic Raw Material Guidelines, July 2021 (**BRM Guidelines**)

10) Environmental Protection Authority Guidance Statement No 33 - Environmental Guidance for Planning and Development (**EPA Guidance Statement No 33**)

11) Greater Bunbury Strategy, 2013

12) Draft Bunbury-Geographe Sub-regional Strategy, 2020

Extracts from the planning framework are included in Annexure B to this decision.

The Tribunal's consideration

31 We have been asked to determine whether condition 3 and condition 9 of the development approval should be maintained. In determining the primary issue, we are required to have due regard to the matters set out in cl 67(2) of Sch 2 to the LPS Regulations (**Deemed Provisions**) including, but not limited to:[27]

1) the aims and provisions of DPS 1;

2) the requirements of orderly and proper planning;

3) any approved State planning policy;[28]

4) any policy of the Western Australian Planning Commission;

5) any policy of the State;

6) the amenity of the locality, including environmental impacts of the development;

7) whether adequate provision has been made for the landscaping of the land to which the application relates and whether any trees or other vegetation on the land should be preserved;

8) the likely effect of the development on the natural environment and any means that are proposed to protect or mitigate impacts on the natural environment; and

9) any comments or submissions received on the application.

What impact would clearing the Tuart trees have on Black-Cockatoo foraging and breeding habitat?

32 Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*), Baudin's Black-Cockatoo (*Calyptorhynchus baudinii*) and the Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) are listed as threatened

[27] We note that reg 74(2) of Pt 2 of the *Planning Regulations Amendment Regulations 2020* (**Amendment Regulations**), which came into operation on 15 February 2021, amended cl 67 of the Deemed Provisions. However, cl 90(2) of the amended Deemed Provisions provides that amendments to Pt 8 and Pt 9 made by the Amendment Regulations do not apply in relation to an application for development approval made before commencement day. As the application for development approval was made before 15 February 2021, cl 67 of the former Deemed Provisions apply in this case.

[28] See also PD Act, s 241(1)(a).

species under State[29] and Commonwealth[30] environment legislation (**Black-Cockatoos**).[31] The key components to the study of Black-Cockatoos for impact assessment are the foraging value of native (and non-native) vegetation, breeding habitat and the identification of roosting sites.[32]

33 Mr Harewood is of the opinion that two of the Tuart trees contain hollows that may be a suitable breeding habitat for Black-Cockatoos.[33] However, Mr Harewood observed that the Tuart trees are not currently in use for breeding by Black-Cockatoos. In Mr Harewood's opinion, the estimated 236 hectares of Tuart woodland within 2 kilometres of the patch would, by definition, contain numerous Tuart trees of various ages. On this basis, Mr Harewood concluded that the removal of the Tuart trees would result in no immediate impact to the Black-Cockatoos' breeding habitat.[34]

34 Dr Bamford concluded that at least two of the Tuart trees have breeding hollows of a suitable size and orientation for Black-Cockatoos. It is Dr Bamford's opinion that while none of the two hollows had been used by Black-Cockatoos in the last several years it is possible that the hollows may attract the species in the next five to 10 years.[35] Dr Bamford observed that the number of similar trees with suitable hollows within 2 kilometres of the Tuart trees is unknown. Consequently, Dr Bamford concluded that a potential exists for significant impact to Black-Cockatoo breeding habitat if the Tuart trees are removed.[36]

35 The experts did not dispute that the trees are approximately 30 metres tall and approximately 200 year's old.[37] Both experts considered the likely age of Tuart trees to form suitable hollows for Black-Cockatoos and agreed that it was in the order of 200 years.[38] Dr Bamford stated that hollow forming capacity is not limited to the size and age of the trees but also storm damage and other factors.[39]

[29] *Biodiversity Conservation Act 2016* (WA).
[30] EPBC Act.
[31] https://www.dpaw.wa.gov.au/plants-and-animals/animals/208-saving-carnaby-s-cockatoo, visited 1 November 2021.
[32] Witness statement of Dr Michael Bamford, dated 15 January 2021, para 7.
[33] Witness statement of Mr Greg Harewood, dated 15 January 2021, para 9; ts 46, 15 June 2021.
[34] Joint statement of Mr Greg Harewood and Dr Michael Bamford, dated 25 January 2021, para 11.
[35] Witness statement of Dr Michael Bamford, dated 15 January 2021, para 21, 23; ts 45, 15 June 2021.
[36] Joint statement of Mr Greg Harewood and Dr Michael Bamford dated 25 January 2021, para 11.
[37] ts 52, 15 June 2021.
[38] ts 50-51, 15 June 2021.
[39] ts 51, 15 June 2021.

36 The experts agreed that Black-Cockatoos are moderately tolerant of human activity close to their nesting places.[40] Dr Bamford stated that extraction activities would not prevent the use of the hollows by Black-Cockatoos in the short-term. Mr Harewood considered that the probability of the hollows being used was very low but he could not say that they would never be used.[41] Both experts acknowledged that Black Cockatoos would use suitable hollows in Tuart trees that have died.[42]

37 The experts disagreed on the density of Tuart trees in the Tuart TEC on the subject land to the north of the Tuart trees. Mr Harewood relied on mapping that was conducted in 2003 that showed 2,842 hectares of Tuart woodland within 10 kilometres of the subject land.[43] In Mr Harewood's opinion, the Tuart TEC would include canopies of Tuart trees and other large eucalypts which would all have the potential to develop hollows for Black-Cockatoos.[44] Dr Bamford observed that there is a lack of information on the numbers of similarly large trees within the Tuart TEC.[45] Mr Harewood and Dr Bamford ultimately agreed that it is not known how many actual trees are present in the Tuart TEC or if any trees in the Tuart TEC currently contain suitable hollows for Black-Cockatoos.[46]

38 The Commonwealth Department of Agriculture, Water and the Environment has developed guidance on the assessment of the significance of paddock trees.[47] Whilst Mr Harewood acknowledged the value of paddock trees in an otherwise cleared landscape, he is of the opinion that the value to fauna would be low compared with an intact stand of Tuart woodland. In Dr Bamford's opinion, a wide range of fauna may be present in the Tuart trees, including invertebrates, reptiles, bats and other bird species. Consequently, Dr Bamford considered the Tuart trees would support other fauna and provide the basis for a future fauna movement corridor.[48]

[40] ts 76-77, 15 June 2021
[41] ts 77, 15 June 2021.
[42] ts 77, 15 June 2021.
[43] Joint statement of Mr Greg Harewood and Dr Michael Bamford, dated 25 January 2021, para 9.
[44] Joint statement of Mr Greg Harewood and Dr Michael Bamford, dated 25 January 2021, para 9.
[45] Witness statement of Dr Michael Bamford, dated 15 January 2021, para 23.
[46] Joint statement of Mr Greg Harewood and Dr Michael Bamford, dated 25 January 2021, paras 9 and 10.
[47] *Paddock trees and national environmental law*, Department of Environment and Energy, Commonwealth of Australia, 2018.
[48] Witness statement of Dr Michael Bamford, dated 15 January 2021, para 25.

Findings - Black-Cockatoo habitat

39 The experts agreed, and we find, that at least two hollows of those detected in the Tuart trees may be of a suitable size and orientation for Black-Cockatoos to use for nesting. We further find, based on the evidence of the experts which we accept, that it is possible that any of the three Black-Cockatoo species may locate and use the two hollows in the next five to 10 years. Consequently, we find that there may be some impact to the breeding habitat of Black-Cockatoos in the short to medium term if the Tuart trees are removed.

40 The experts agreed, and we find, that it is not known if any trees in the northern Tuart woodland currently contain suitable hollows for Black-Cockatoos. We find, based on the evidence of Dr Bamford which we accept, that due to the size and age of the Tuart Trees, hollows may form in the future which may be a suitable habitat for Black-Cockatoos. However, based on the evidence before us, we are unable to conclude that the impact to the present breeding of Black-Cockatoos by the removal of the Tuart trees would be significant.

41 We accept the evidence of Dr Bamford, and we find, that notwithstanding a lack of understorey, the Tuart trees do support other native fauna and may provide habitat connectivity in the form of a movement corridor.

Do the Tuart trees form part of the Tuart TEC?

42 The Conservation Advice provides the diagnostic characteristics to assist in identifying a 'patch' of native vegetation as being part of the Tuart TEC.[49] If a patch is identified and meets the minimum condition thresholds for a Tuart TEC in the Conservation Advice, then it is considered a Matter of National Environmental Significance (**MNES**) under the EPBC Act.[50] It is an offence under the EPBC Act for a person to take an action[51] that will have or is likely to have a significant impact on a MNES without the approval of the Federal Minister for the Environment.[52]

43 The ecological importance of larger patches, which are 5 hectares or more, is recognised under the Conservation Advice. There was no

[49] Conservation Advice, s 3.2; Exhibit 2, page 173.
[50] Conservation Advice, s 3.1; Exhibit 2, page 171.
[51] An action is a project, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things: EPBC Act, s 523.
[52] In relation to a listed threatened ecological community, see s 18A, EPBC Act.

dispute, and we find, that the Tuart woodland located to the north of the Tuart trees has an area of approximately 8 hectares.[53]

44 The Conservation advice provides:[54]

> A patch may include small areas without understory vegetation, such as bare ground, as well as waterbodies or hardscape (e.g. roads, paths, car parks or buildings) that do not significantly alter the overall function of the ecological community. These small areas so not break up a patch, or divide a patch into multiple patches, as long as there are some parts of the canopy within 60 m of the outer edges of the canopies of adjacent Tuart trees (as per Section 3.2.1, and **Figure 3**).

45 Prof Dixon and Mr Lundstrom agreed, and we find, that the Tuart trees in question form part of a 'patch' as defined in the Conservation Advice because the Tuart Trees are within 60 metres of the outer edges of the canopies of the Tuart woodland to the north.[55] There was no dispute, and we find, that the patch, comprising the Tuart trees and the Tuart woodland to the north, meets the key diagnostic characteristics in s 3.2.1 of the Conservation Advice and is greater than 5 hectares in area. Consequently, based on the evidence of Prof Dixon and Mr Lundstrom, which we accept, we find that the Tuart trees form part of the Tuart TEC.[56]

46 Prof Dixon and Mr Lundstrom agreed that the issue that remains, from an ecological perspective, is whether the loss of the Tuart trees is of significance and will negatively impact the ecological integrity of the Tuart TEC.[57] We next consider whether clearing the Tuart trees will have a significant impact on the Tuart TEC.

Would clearing the Tuart trees have a significant impact on the Tuart TEC?

47 The Department of Water and Environmental Regulation (**DWER**) considered the applicant's request for a clearing permit under s 51E(1) of the *Environmental Protection Act 1986* (WA) (**EP Act**) and prepared a preliminary assessment report (**DWER assessment report**). The DWER assessment report did not identify any significant issues with respect to the clearing of native vegetation that would prevent the grant

[53] Witness statement of Mr Michael Lundstrom, dated 18 January 2021, para 23.4.
[54] Conservation Advice, s 3.2.2; Exhibit 2, page 174-175.
[55] Joint statement of Mr Kingsley Dixon and Mr Michael Lundstrom, dated 27 January 2021, para 8.
[56] Joint statement of Mr Kingsley Dixon and Mr Michael Lundstrom, dated 27 January 2021, para 14.
[57] Joint statement of Mr Kingsley Dixon and Mr Michael Lundstrom, dated 27 January 2021, para 14

of a clearing permit but DWER deferred its decision until the applicant had received approval for the limestone extraction from the Shire.[58]

48 The principles for assessing native vegetation clearing applications are set out in *A guide to the assessment of applications to clear native vegetation*[59], a DWER policy document based on the ten clearing principles in Sch 5 to the EP Act (**Clearing principles**). In applying the Clearing principles, the DWER assessment report concluded:[60]

> The proposed clearing may be at variance with principles (a) and (b) and is not likely to be at variance with the remaining clearing principles.

49 Principle (a) of the Clearing principles provides that '[n]ative vegetation should not be cleared if it comprises a high level of biological diversity'. Principle (b) of the Clearing principles provides that '[n]ative 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'. Interestingly, the DWER assessment report concluded that the Tuart trees were part of the patch of the Tuart TEC[61] but did not refer to any potential variance of the proposed clearing with principle (d) of the Clearing principles (**Clearing principle (d)**) which provides that '[n]ative vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a threatened ecological community'. We consider that Clearing principle (d) is relevant to our determination because the Tuart trees form part of a threatened ecological community.

50 In relation to the presence of the Tuart TEC, the DWER assessment report provides:[62]

> To be considered the TEC, the vegetation patch must meet key diagnostic characteristics, the primary defining feature of which is the presence of at least two living established Tuart trees in the uppermost canopy layer. The distance between the Tuart trees must be no more than 60 metres between the outer edges of the canopies of the adjacent Tuart trees. The Tuart trees may occur as single stemmed trees or as a mallee growth form. The presence of the TEC is also based on the condition of the native vegetation within the patch (Department of the Environment and Energy, 2019).

[58] Letter from DWER to Mr Mike Lundstrom dated 31 August 2021, enclosing the DWER assessment report.
[59] *A guide to the assessment of applications to clear native vegetation, Under Part V Division 2 of the Environmental Protection Act 1986*, Department of Environment Regulation, December 2014.
[60] Exhibit 2, page 124; DWER assessment report, page 3.
[61] Exhibit 2, page 124; DWER assessment report, page 2.
[62] Exhibit 2, page 124; DWER assessment report, page 2.

> The six trees within the application are mature Tuarts that occur within 60 metres of one another and also within 60 metres of the remnant vegetation containing mature Tuart trees on the northern border of the property. Therefore, the estimated patch of the TEC would incorporate all the trees in the application area and the trees in the vegetation to the north, and would cover an area larger than five hectares. Five hectare patches or greater, in any condition, are part of the TEC (Department of the Environment and Energy, 2019).
>
> Given the presence of the TEC, the proposed clearing may be at variance to principle (a). Whilst the application involves the clearing of a TEC, the removal of the six trees that are a part of a much larger patch will not significantly impact the local occurrence of this TEC or impact on the conservation status of the TEC. Weed and dieback management practices will aid in mitigating impacts to the remaining occurrence of this TEC.

51 The applicant contends that the DWER assessment report demonstrates that the removal of the Tuart trees would not have a significant impact on the Tuart TEC. The applicant relies on the evidence of Mr Lundstrom in support of this contention. Mr Lundstrom observed that DWER, which is the state entity charged with the task of balancing ecological considerations with the human demand for resources, has considered the Conservation Advice and made a decision that, on balance, clearing the Tuart trees would not constitute a significant impact on the integrity and perpetuity of the Tuart TEC.[63]

52 Similarly, it is Mr Lundstrom's opinion that the proposed clearing of the Tuart trees would not constitute a significant impact on the Tuart TEC. Mr Lundstrom formed this opinion for several reasons, including that the Tuart trees are isolated from the 8 hectare Tuart woodland to the north, the degraded condition of the vegetation surrounding the Tuart trees, and the absence of any associated middle or understorey species.[64] Mr Lundstrom also observed that the Tuart trees are highly exposed on the top of a hill[65] and that they could be adversely affected by falling groundwater levels due to climate change and active limestone and sand extraction surrounding them on three sides.[66] It is Mr Lundstrom's opinion that the clearing of the Tuart trees 'would not cause the extent of

[63] Joint statement of Mr Kingsley Dixon and Mr Michael Lundstrom, dated 27 January 2021, para 22.
[64] Witness statement of Mr Michael Lundstrom, dated 18 January 2021, para 23.
[65] Witness statement of Mr Michael Lundstrom, dated 18 January 2021, para 23.
[66] Joint statement of Prof Kingsley Dixon and Mr Michael Lundstrom, dated 27 January 2021, para 15; ts 105, 15 June 2021.

the Tuart TEC to fall below the recommended 30 per cent of its pre-European clearing'.[67]

53 The applicant tendered photographs of other Tuarts on the subject land and adjacent to Taranto Road of a similar size and height to the Tuart trees.[68] The applicant also observed that the Tuart trees are barely part of the patch because without the canopy of the northern-most tree, the Tuart trees would not form part of the Tuart TEC.[69]

54 The Shire's position is that removal of the Tuart trees will have a significant impact on the Tuart TEC because of the substantial size and age of the trees, and the potential for hollow creation given their existing age. The Shire relies on the evidence of Prof Dixon in support of its position. Prof Dixon is of the opinion that each of the Tuart trees is approximately 30 metres (or more) tall,[70] and, based on a conservative estimate, approximately 200 years' old.[71] Prof Dixon also estimated, based on an assessment using the national Vegetation Height and Structure dataset,[72] that approximately 1% of the Tuart canopy within 10 kilometres of the subject land is greater than 20 metres.[73] Mr Lundstrom did not disagree with these figures.[74]

55 Consequently, Prof Dixon considered that the attributes of the Tuart trees (size and age) warrant their retention even though there is a higher proportion (greater than 30%) of the Tuart TEC remaining in the Shire.[75] Prof Dixon stated:[76]

> So the impact on the greater patch is because these are such significant and large trees, their role in the broader patch dynamics because of their unique size and potentially unique ecological function, with hollow bearing, for example, as one case, is - is something that makes them quite unique in that landscape.

[67] Witness statement of Mr Michael Lundstrom, dated 18 January 2021, para 34.2.
[68] Exhibit 19, Exhibit 21.
[69] ts 26, 14 June 2021; ts 205, 16 June 2021.
[70] Supplementary witness statement of Prof Kingsley Dixon, dated 4 February 2021, para 18.
[71] Witness statement of Prof Kingsley Dixon, dated 15 January 2021, para 22.
[72] Developed by Terrestrial Ecosystem Research Network, uses a combination of satellite vegetation properties with satellite radar to calculate the vegetation height class across Australia on a 30-metre resolution: Supplementary witness statement of Prof Kingsley Dixon, dated 4 February 2021, para 15.
[73] Supplementary witness statement of Prof Kingsley Dixon, dated 4 February 2021, paras 15 and 17.
[74] ts 94, 15 June 2021.
[75] Joint statement of Prof Kingsley Dixon and Mr Michael Lundstrom, dated 27 January 2021, para 21.
[76] ts 130, 15 June 2021.

56 When asked if the Tuart trees would be vulnerable to changes in groundwater because of mining activity, Prof Dixon stated:[77]

> I would be surprised given that the mining activity is to the south, which had been in place for a long period of time, haven't manifested in any stag-heading die back on the southern-most trees. In fact, all of the trees show a similar health regime. Trees of that age are, undoubtedly, tapping much deeper aquifers for their water supply. They would have a superficial root system which gets the incoming rainfall, but they would have a (indistinct) system much deeper[.]

57 Prof Dixon provided the following evidence in relation to how the absence of a native understorey affects the ecological value of the Tuart trees:[78]

> So this was one of the more difficult parts of the assessment because we - generally, when we're listing threatened ecological communities, there's a level of intactness from subsoil to the top of the canopy. But it was very clear from deputations that were made to us, both by the state departments groups, such as Birdlife, Worldwide Fund for Nature, and so on and the indigenous community that, in fact, it was the tree canopy that was important. And, in the final assessment, it was the arboreal element that was the most significant part of the TEC, noting that we had probably less than 5 per cent of all of the tuart TEC with an intact understory remaining.
>
> So the arboreal element was the one supporting the - a whole range of wildlife from bats, to threatened possums, to birds, plus invertebrate fauna that was sustained. So the level to which an understory is a critical and necessary part of tuarts was considered not as important as protecting the arboreal element.

58 Prof Dixon raised concerns about cumulative impacts on the Tuart TEC.[79] By comparing recent aerial photography as at 1 November 2019 with the area of Tuart woodland mapped in 2003, Prof Dixon identified that approximately 71 hectares of Tuart canopy had been lost within 10 kilometres of the subject land in that period.[80] Mr Lundstrom did not disagree with these figures.[81]

[77] ts 86, 15 June 2021.
[78] ts 98-99, 15 June 2021.
[79] ts 125, 15 June 2021.
[80] Supplementary witness statement of Prof Kingsley Dixon, dated 4 February 2021, para 10.
[81] ts 94, 15 June 2021.

Findings - impact on Threatened Ecological Community

59 For the reasons that follow, we find that the removal of the Tuart trees is likely to have a significant impact on the Tuart TEC.

60 First, the experts agreed, and we find, that the Tuart trees are of a significant and substantial size and age commensurate with hollow-bearing capacity.[82] There was no dispute, and we find, that the percentage of the Tuart canopy within 10 kilometres of the subject land that are of an equivalent or greater height than the Tuart trees is a small fraction of 1%.[83]

61 Second, the experts agreed, and we find, that the Tuart trees are in excellent health and exhibit a stature and conformity indicating little or no disease, predation or limb drop indicative of growing in an unsatisfactory environment or location.[84]

62 Third, there was no dispute, and we find, that two of the Tuart trees possess hollows of likely suitable size and orientation for use by Black-Cockatoos for nesting. We further find, based on the evidence of Mr Lundstrom and Dr Bamford, which we accept, that Black-Cockatoos would continue to use suitable nesting hollows following the death of the Tuart trees.[85]

63 Fourth, we accept the evidence of Prof Dixon, and we find, that the absence of an understorey does not detract from the ecological value of the Tuart trees as it relates to the Tuart TEC. Our finding is supported by the Conservation Advice which contemplates that a patch may include small areas without understorey vegetation.[86]

64 Fifth, we accept the evidence of Prof Dixon, and we find, that the presence of more than 30% Tuart TEC in the Shire is not a reason to allow the clearing of the Tuart trees. Our finding is supported by EPA Guidance Statement No 33 which provides that the threshold level of 30% is a minimum threshold and should be higher for rare ecological communities. EPA Guidance Statement No 33 provides, in B1.1.3, the broad principles for biodiversity conservation including the following:

[82] Joint statement of Prof Kingsley Dixon and Mr Michael Lundstrom, dated 27 January 2021, para 9.
[83] Supplementary witness statement of Prof Kingsley Dixon, dated 4 February 2021, paras 17 and 19; ts 94, 15 June 2021.
[84] Joint statement of Prof Kingsley Dixon and Mr Michael Lundstrom, dated 27 January 2021, para 10.
[85] ts 77, 15 June 2021.
[86] Conservation Advice, s 3.2.2. Exhibit 2, page 174.

> **Maintain biodiversity at sustainable levels**
>
> All natural resources (land, water and biodiversity) must be managed with a view to maintaining native species and ecological communities at sustainable levels within regions.
>
> The EPA considers it is important that ecological communities are maintained above the threshold of 30% of the original pre-clearing extent of each community. **This is the minimum level and should be higher for many ecological communities, for example, rare and geographically confined communities**.
>
> Ecological communities now at levels below 30% of their original extent in regions should be fully retained.
>
> Threatened ecological communities and species should be fully protected and regenerated to sustainable levels.
>
> (emphasis added)

65 Sixth, whilst there was no evidence before us on the effect of climate change or mining on groundwater levels at the subject land, we accept the evidence of Prof Dixon, and we find, that the Tuart trees are unlikely to be impacted from fluctuations in groundwater due to the ability of their roots to access deeper aquifers.[87]

66 Seventh, the DWER assessment report is a matter that is relevant to our consideration and one to which we must have due regard, but it is not determinative. We find that in preparing the DWER assessment report, DWER relied on photographs of the application area provided by the applicant to determine the condition of the vegetation.[88] In making our findings on the size, age and health of the Tuart trees we relied on the evidence of experts who had the benefit of visiting the site and were subject to cross-examination under affirmation. Consequently, we observe that the evidence on which we have based our findings on the condition and significance of the Tuart trees to the Tuart TEC is more reliable than the information available to DWER at the time it prepared the DWER assessment report. Notwithstanding our finding that clearing of the Tuart trees is likely to have a significant impact on the Tuart TEC, we next consider whether the removal of the trees would be environmentally acceptable having regard to the relevant planning framework.

[87] ts 86, 15 June 2021.
[88] DWER assessment report, page 3; ts 88, 15 June 2021.

Would clearing the Tuart trees be consistent with the aims and provisions of DPS 1?

67 One of the objectives of DPS 1 is to promote economic development within the Shire and increase local employment opportunities.[89] DPS 1 also aims to protect and preserve, in the long-term, the more important flora and fauna habitats and other environmentally sensitive areas that are prone to degradation.[90]

68 Schedule 1 to DPS 1 lists 'Places of Landscape Value' in the Shire. Clause 8.1.1 of DPS 1 provides that lands shown as a Place of Landscape Value on the Scheme Maps are considered by the local government to be of scenic or other value and should be retained in their present state, or restored to their original state, or to a state acceptable to the local government.

69 There was no dispute, and we find, that the subject land is a Place of Landscape Value under cl 8.1.1 of DPS 1, requiring the special approval of the Shire under cl 8.1.2 of DPS 1 for the clearing of native vegetation. We consider that the status of the subject land as a Place of Landscape Value under cl 8.1.1 of DPS 1 is a relevant factor in determining whether the Tuart trees should be cleared.

70 The Shire did not adduce expert evidence on the effect of the removal of the Tuart trees on the natural landscape. However, under cross-examination, Mr Hall rejected the suggestion that the Tuart trees, located at the highest point on the ridgeline, would result in an unusual landscape once the subject land was rehabilitated for use as an agricultural paddock.

71 In Mr Allerding's opinion, the subject land is not significantly visible from any of the distributor and regional roads nearby because the subject land is separated 360 metres from Taranto Road at its closest point to the south and 900 metres from Forrest Highway to the east. Therefore, Mr Allerding does not consider the removal of the Tuart trees to have any significant landscape affect overall.

72 We accept the evidence of Mr Allerding, and we find, that the visibility of the Tuart trees from distributor and regional roads is limited and, therefore, the landscape value of the Tuart trees from those roads is also limited.

[89] DPS 1, cl 1.6.1(c).
[90] DPS 1, cl 1.6.1(g).

Would clearing the Tuart trees be environmentally acceptable having regard to the planning framework for extractive industry?

73 SPP 2.0 provides that a ready supply of basic raw materials close to developing areas is required in order to keep down the cost of land development and the price of housing.[91] SPP 2.0 directs decision-makers to take account of the availability and condition of natural resources based on the best available information.[92] It also directs decision-makers to avoid development that may result in unacceptable environmental damage and 'identify and protect important and economic mineral resources to enable mineral exploration and mining in accordance with acceptable environmental standards'.[93]

74 Facilitating the extraction of basic raw materials in an environmentally acceptable manner is one of the objectives of the SMBRM Policy. The SMBRM Policy aims to 'encourage the mining of strategic resources in accordance with acceptable environmental standards'.[94]

75 Clause 5.9 of SPP 2.5 and cl 1.5 of the SMBRM Policy also recognise the need to undertake the extraction of strategic resources in a manner that is environmentally acceptable. They provide:

> Identification of strategic resources does not presume that extraction would be environmentally acceptable or that subsequent approval for extraction would be guaranteed. Nor does it remove the requirement of local authorities or proponents to meet their environmental obligations to identify those environmental constraints that may determine the extent and/or manner in which a proposal may be implemented.

76 Clause 5.9(i) of SPP 2.5 and cl 5.11 of the SMBRM Policy also provide:

> [P]lanning decision-makers are to give due regard to advice from environmental agencies and consider potential impacts on fragmentation and connectivity of remnant vegetation.

77 The applicant contends that the planning framework expressly contemplates the extraction of basic raw materials where environmental degradation is avoided or minimised and can be conducted in accordance

[91] SPP 2.0, cl 5.7.
[92] SPP 2.0, cl 5.1(iii)
[93] SPP 2.0, cl 5.1(i), cl 5.7(i).
[94] SMBRM Policy, cl 4.3.

with acceptable environmental standards.[95] In support of this contention, the applicant relies on the evidence of Mr Allerding and Mr Noble.

78 In Mr Allerding's opinion, the removal of the Tuart trees is consistent with the designation of the subject land as a state and regionally significant resource under the SMBRM Policy.[96] Mr Allerding acknowledged that extractive industries are required to conduct operations in an environmentally acceptable manner.[97] However, Mr Allerding formed the opinion that the removal of the Tuart trees is environmentally acceptable because the vegetation condition of the application area was found by DWER to be degraded to completely degraded, the DWER assessment report had not identified any significant issues in respect to the clearing of the Tuart trees, and Mr Harewood found a lack of suitable hollows for Black-Cockatoos.[98]

79 If the Tuart trees and associated batters and buffers[99] are retained, Mr Noble calculated that the volume of limestone material available for extraction from the four stages is a total of 256,125.22m^3.[100] However, if the Tuart trees and associated batters and buffers are not retained, the limestone material available for extraction from the four stages is 520,452.93m^3.[101] Consequently, Mr Noble determined that 50.7% of the extractable limestone material from the four stages would be sterilised if the Tuart trees were retained in stages 3 and 4.[102] Mr Noble was unable to determine the actual volume of limestone resource that would be sterilised because it was outside his area of expertise.[103]

80 Based on the Draft Sub-Regional Strategy, Mr Allerding observed that demand for basic raw materials (**BRM**) in the Perth and Peel regions is expected to remain high.[104] Because the subject land is substantially cleared and represents an existing limestone resource operation, Mr Allerding considered it a balanced and appropriate response to allow the extraction of limestone in this instance, particularly as access to resources in the Perth and Peel regions is likely to diminish.[105]

[95] Applicant's SIFC, para 14(g). See, for example, SPP 2.0, cl 5.7(i); SMBRM Policy, cl 4.3.
[96] Witness statement of Mr Stephen Allerding, dated 18 January 2021, para 70.
[97] Witness statement of Mr Stephen Allerding, dated 18 January 2021, para 61. See SMBRM Policy, cl 1.5; SPP 2.5, cl 5.9.
[98] Witness statement of Mr Stephen Allerding, dated 18 January 2021, para 70.
[99] Excluding the batter of 1:6 on the western edge of the proposed stage 1 extraction area.
[100] Supplementary witness statement of Mr Darren Noble, dated 31 May 2021, para 7.
[101] Supplementary witness statement of Mr Darren Noble, dated 31 May 2021, para 8.
[102] Supplementary witness statement of Mr Darren Noble, dated 31 May 2021, para 9.
[103] ts 35, 14 June 2021.
[104] See Draft Bunbury-Geographe Sub-Regional Strategy, November 2020, cl 17.6.
[105] Supplementary witness statement of Mr Stephen Allerding, dated 24 February 2021, para 9, 16-18.

81 SPP 2.4 was gazetted on 16 July 2021 and applies throughout the State to development proposals that are over or adjacent to, sites identified to contain BRM resources. Clause 4 of SPP 2.4 provides that SPP 2.4 should be read in conjunction with the BRM Guidelines. Clause 4 also provides that:

> *State Planning Policy 2.5 Rural Planning* (**SPP 2.5**) addresses BRM matters on rural land. Until such time as SPP 2.5 is reviewed, where there is a conflict between SPP 2.5 and this policy in relation to BRM matters, this policy prevails to the extent of any inconsistency.

82 The applicant contends that by operation of cl 4 of SPP 2.4, SPP 2.4 prevails and, therefore, supersedes SPP 2.5. The applicant further contends that the BRM Guidelines emphasise the primary role of specialist environmental decision-making agencies, in particular DWER, in relation to the clearing of native vegetation.[106] It is the applicant's position that there is a specific and discrete statutory regime set out in Part V Division 2 of the EP Act for the determination of applications for the clearing of native vegetation and, therefore, it is not the role of the Tribunal to undertake a de facto review of the DWER assessment report.[107]

83 The Shire contends that the planning framework does not prioritise the extraction of basic raw materials over environmental considerations.[108] The Shire further contends that the Tuart TEC is an area of high conservation significance for the purposes of EPA Guidance Statement No 33. It is the Shire's position that clearing the Tuart trees would be inconsistent with the broad principles in B1.1.3 of EPA Guidance Statement No 33 for biodiversity conservation and the protection of native vegetation.[109] The Shire relied on the evidence of Mr Hall in support of these contentions. Having regard to the planning framework in SPP 1, SPP 2.0, SPP 2.5 and EPA Guidance Statement No 33, it is Mr Hall's opinion that the Tuart trees have a level of importance or significance which justifies their retention.[110]

84 It is the Shire's position that SPP 2.4 applies throughout the State and is likely to apply to the subject land.[111] The Shire contends that SPP

[106] In support of its contention, the applicant referred to *State Planning Policy 2.4 Planning for Basic Raw Material Guidelines, July 2021*, ss 2.3, 3.1, 4, 4.4, 4.4.3, 5.2, and 5.4.
[107] Applicant's submissions on effect of State Planning Policy 2.4 – Planning for Basic Raw Materials dated 13 August 2021, para 13.
[108] Respondent's SIFC, para 41.
[109] Respondent's SIFC, para 40(f).
[110] Witness statement of Mr Simon Hall, dated 18 January 2021, para 30, 32.
[111] Respondent's submission in relation to State Planning Policy 2.4 dated 13 August 2021, paras 2, 7.

2.5 continues to apply under cl 4 of SPP 2.4 because it has not been reviewed. The Shire does not perceive a conflict between SPP 2.4 and SPP 2.5 or the GBRS Policy. Consequently, the Shire says that SPP 2.4 and the BRM Guidelines do not materially alter the policy position with respect to the extraction of basic raw materials in cases where the proposed extraction raises environmental concerns, such as the removal of trees forming part of a threatened ecological community.[112]

85 The Shire contends that there was no evidence before the Tribunal that the reduced supply of limestone from the subject land would have market implications because it is a small percentage of the estimated supply of limestone in the region.[113] In support of its contention, the Shire relied on the evidence of Mr Hall. Mr Hall concluded that the relationship between future supply and demand under the Draft Sub-Regional Strategy is not known and that further study is required.[114] Also, in his opinion, there is nothing in the draft Strategy that prioritises the extraction of basic raw materials over environmental considerations.[115]

Findings – environmental acceptability

86 There was no dispute, and we find, that under the SMBRM Policy and associated planning framework, the extraction of basic raw materials is capable of approval when it is conducted in accordance with acceptable environmental standards or in an environmentally acceptable manner.[116]

87 For the reasons that follow, we find that SPP 2.4 and the BRM Guidelines do not alter the policy position with respect to the extraction of basic raw materials where the proposed extraction raises matters that go to the environmental acceptability of the proposal. First, we find that under cl 4 of SPP 2.4, SPP 2.5 continues to apply to the extent of any inconsistency with SPP 2.4. Second, we find that SPP 2.4 is not inconsistent with SPP 2.5 because the policy intent of SPP 2.4 is to facilitate the responsible extraction and use of the State's BRM resources. Third, we find that SPP 2.4 and the BRM Guidelines do not alter the express provisions of SPP 2.5, referred to above, which anticipate that environmental constraints will be identified to any proposed extraction

[112] Respondent's submission in relation to State Planning Policy 2.4 dated 13 August 2021, paras 6.
[113] ts 180, 16 June 2021.
[114] Witness statement of Mr Simon Hall, dated 18 January 2021, para 14.
[115] Witness statement of Mr Simon Hall, dated 18 January 2021, para 15.
[116] Witness statement of Mr Stephen Allerding, dated 18 January 2021, para 61; Witness statement of Mr Simon Hall, dated 18 January 2018, para 31; ts 161, 15 June 2021.

and that proposals will be implemented in an environmentally acceptable manner.

88 It is the applicant's position that SPP 2.4 and the BRM Guidelines emphasise the primary role of specialist environmental decision-making agencies in relation to the clearing of native vegetation and that the Tribunal should not undertake a de facto review of the DWER assessment report.[117] The applicant contends that it is not the role of planning authorities to impose conditions that purport to regulate matters otherwise addressed by regulators under other statutory regimes and referred the Tribunal to ***SITA Australia Pty Ltd and Wheatbelt Joint Development Assessment Panel*** [2016] WASAT 22 at [127]-[128] (***SITA***) which cites ***SITA Australia Pty Ltd v Greater Dandenong City Council*** [2007] VCAT 156; (2007) 150 LGERA 266 at [24]-[33].

89 Whilst we acknowledge that the BRM Guidelines refer to the specialist role of DWER in assessing environmental impacts under Part IV of the EP Act and the issuing of clearing permits under Part V, we observe that the role of the Tribunal is to make findings of fact based on the evidence before it. To do otherwise would be abrogating the Tribunal's statutory function to produce the correct and preferable decision in the de novo review of government decision-making. Further, we find that the decision in ***SITA*** can be distinguished from the circumstances of this case because the operation of the PD Act under which an approval is required in relation to the clearing of vegetation is not affected by the clearing provisions of the EP Act or the grant of a clearing permit.[118]

90 We accept the evidence of Mr Noble, and we find, that 50.7% of the extractable limestone material from the four stages would be sterilised if the Tuart trees were retained in stages 3 and 4. However, the extraction of limestone material in stages 3 and 4 does not form part of the Shire's approval that is the subject of this proceeding and, therefore, we find that the retention of the Tuart trees would not impact on the extraction of limestone material in stages 1 and 2.

91 The applicant contends that all aspects of its proposal to extract basic raw materials on the subject land will be conducted in an environmentally acceptable manner and, therefore, it has met the relevant threshold for environmental performance (through, for example, dust,

[117] Applicant's submission on effect of State Planning Policy 2.4, dated 13 August 2021, para 16-17; ts 200, 16 June 2021.
[118] Section 51T, EP Act.

weed and dieback management plans) without the retention of the Tuart trees. We recognise that the environmental management practices adopted by the applicant are contemplated by the SMBRM Policy because the Shire has granted approval to the proposal. However, we do not consider that sound environmental management practices alone can be relied on by the applicant to meet the threshold for environmental acceptability under the SMBRM Policy where the applicant proposes to clear native vegetation to facilitate resource extraction.

92 The applicant is proposing four fenced vegetated islands as part of its rehabilitation program (**proposed tree islands**). In respect of the proposed tree islands, Prof Dixon stated:[119]

> We're not comparing apples for apples. What we have are six aged elements - remnants of a vast forest system removed and then replaced with four vegetated small islands of equivalent size to the dripline of what appears to be the trees. So you've removed those significant aged elements and, in the current edition of the standards for ecological restoration, we speak about the loss of old growth as something that restoration and rehabilitation can't reinstate. So it requires another (indistinct) special component of consideration. We don't believe that offsets are adequate to address something when you've got, collectively, those six trees of 200 years old - 1200 years.

93 We accept the evidence of Prof Dixon, and we find, that the proposed tree islands would not replace the old growth values of the Tuart trees.[120] Consequently, we find that reliance on tree islands as a form of biodiversity offset is not, in the circumstances of this case, environmentally acceptable because the tree islands would not offset the loss of the significant ecological value of the Tuart trees. We further find that the Tuart trees may provide habitat connectivity in the form of a movement corridor.

94 Because the Tuart trees satisfy the Conservation Advice criteria of a patch and, therefore, form part of the Tuart TEC, we find that clearing them would be inconsistent with the principles in B1.1.3 of EPA Guidance Statement No 33 relating to biodiversity conservation and at variance with the clearing principle (d) referred to in B1.2.1(ii)(e) and B1.2.1(ii)(f) of EPA Guidance Statement No 33. Notwithstanding the presence of the Tuart TEC, we accept the evidence of Prof Dixon, and we find, that because of their age and size the Tuart trees have significant

[119] ts 93, 15 June 2021.
[120] ts 128, 15 June 2021.

ecological value as old growth habitat, including hollow bearing capacity for threatened bird species such as Black-Cockatoos.

95 Because of the significant ecological value of the Tuart trees, we accept the evidence of Mr Hall, and we find, that clearing them would be inconsistent with the SMBRM Policy and associated planning framework, including SPP 2.0 and SPP 2.5. Consequently, without the imposition of condition 3 and condition 9, we find that the proposed extraction that is the subject of the Shire's approval would not occur in an environmentally acceptable manner.

Would clearing the Tuart Trees be consistent with orderly and proper planning?

96 In considering the application, we are required by cl 67(2)(b) of the Deemed Provisions to have due regard to the requirements of orderly and proper planning.

97 The meaning of the phrase 'orderly and proper planning' was considered by the Western Australia Supreme Court in ***Marshall v Metropolitan Redevelopment Authority*** [2015] WASC 226 (***Marshall***). Pritchard J held at [179]-[180]:

> … The ordinary meaning of the word 'proper' includes 'suitable for a specified or implicit purpose or requirement; appropriate to the circumstances or conditions; of the requisite standard or type; apt, fitting; correct, right'. The ordinary meaning of the word 'orderly' includes 'characterised by or observant of order, rule, or discipline'. In other words, to be orderly and proper, the exercise of a discretion within the planning context should be conducted in an orderly way - that is, in a way which is disciplined, methodical, logical and systematic, and which is not haphazard or capricious.
>
> The planning discretion should be directed to identifying the 'proper' use of land - that is, the suitable, appropriate, or apt or correct use of land. In order to do so, the exercise of discretion would clearly need to have regard to any applicable legislation, subsidiary legislation and planning schemes (such as region schemes, town planning schemes, local planning schemes) and policy instruments. The State Administrative Tribunal has observed that 'at the heart of orderly and proper planning' is a public planning process which permits the assessment of individual development applications against existing planning policies 'so that the legitimate aspirations found in the planning framework may be translated into reality'.
>
> However, there is no reason in principle why planning legislation and instruments will be the only matters warranting consideration in

> determining what is a 'proper' planning decision. The matters which warrant consideration will be a question of fact to be determined having regard to the circumstances of each case.
>
> While the exercise of discretion will involve a judgment about what is suitable, appropriate, or apt or correct in a particular case, that judgment must (if it is to be 'orderly') be an objective one. If the exercise of discretion is to be an orderly one, the planning principles identified as relevant to an application should not be lightly departed from without the demonstration of a sound basis for doing so, which basis is itself grounded in planning law or principle. A broad range of considerations may be relevant in that context.

98 In ***Mount Lawley Pty Ltd and Western Australian Planning Commission*** [2007] WASAT 59 ***(Mt Lawley***) at [47], the Tribunal recognised that '[s]ustainability is now a core element of orderly and proper planning'. The Tribunal in ***Mt Lawley*** considered the meaning of the term 'sustainability,' and determined that (at [48]):

> Sustainability requires the integration of the social, economic and environmental consequences of land use and development in order to deliver a better quality of life now and for future generations[.]

99 The applicant contends that the primary aim of planning is to provide for the sustainable use and development of land having regard to, among other things, economic sustainability.[121] The applicant points to the fact that the retention of the six Tuart trees will significantly reduce the volume of limestone able to be extracted from the subject land as matter that weighs in favour of clearing the Tuart trees.[122]

100 The objective in s 3(1)(c) of the PD Act is to promote the sustainable use and development of land, a principle also referred to in cl 5 of SPP 1.0. The term 'sustainable development', which is not defined in the PD Act, was recently considered by the Tribunal in ***Robertson and City of Albany*** [2019] WASAT 3 (***Robertson***) at [174]-[180]. In ***Robertson***, the Tribunal reaffirmed that sustainable development is a core element of orderly and proper planning and referred to the seminal decision of Preston J of the New South Wales Land and Environment Court in ***Telstra Corporation Limited v Hornsby Shire Council*** [2006] NSWLEC 133; (2006) 146 LGERA 10; (2006) 67 NSWLR 256 (***Telstra***).

[121] Applicant's SIFC, para 14(a).
[122] Applicant's SIFC, para 14(h),(i).

101 Having regard to the principles of orderly and proper planning, the applicant contends that there must be a planning reason to depart from the DWER preliminary assessment.[123] The applicant further contends that condition 3 should not be maintained because the clearing of the Tuart trees will promote the environmentally and economically sustainable use and development of the subject land.[124] It is the applicant's position that the retention of the Tuart trees, and associated batters and buffers, will significantly reduce the volume of limestone able to be extracted from the subject land.[125] In support of these contentions, the applicant relied on the evidence of Mr Allerding and Mr Noble.

102 Based on Mr Noble's calculations referred to in [79] above, 50.7% of the extractable limestone material from the four stages would be sterilised if the Tuart trees were retained in stages 3 and 4.[126] In light of Mr Noble's calculations, and the close proximity of the subject land to Harvey and Bunbury, it was Mr Allerding's opinion that accessing the identified resources on the subject land will enable the continued supply of limestone in an efficient manner for the anticipated significant growth in the Greater Bunbury Region.[127] Mr Allerding concluded, therefore, that granting the application without a requirement for the retention of the Tuart trees would be consistent with the sustainable use and development of the subject land under *State Planning Policy 1 - State Planning Framework* (**SPP 1**), and the area's designation as a State and regionally significant resource under SMBRM and SPP 2.4.[128]

103 Because of the significant ecological value of the Tuart trees, the Shire contends that the clearing of those trees should be regarded as a form of unsustainable development and, therefore, inconsistent with the purposes of the PD Act and SPP 1, as well as the policy objectives of SPP 2.5 and the policy measures in SPP 2.0.[129]

104 In support of its contentions, the Shire relied on the evidence of Mr Hall. It is Mr Hall's opinion that while the planning framework generally encourages the extraction of basic raw materials from the

[123] ts 208, 16 June 2021.
[124] Applicant's SIFC, para 14(h
[125] Applicant's SIFC, para 14(l).
[126] Supplementary witness statement of Mr Darren Noble, dated 31 May 2021, para 9.
[127] Witness statement of Mr Stephen Allerding, dated 18 January 2021, para 76(d).
[128] ts 143, 15 June 2021; Witness statement of Mr Stephen Allerding, dated 18 January 2021, paras 69-70, 76(d). The applicant accepts that the provisions of SPP 2.4 in effect at the time of the hearing did not apply to the subject land: Applicant's submissions on effect of State Planning Policy 2.4 – Planning for Basic Raw Materials dated 13 August 2021, para 4.
[129] Respondent's SIFC, paras 40(i) and (j).

subject land, that extraction is not necessarily prioritised over environmental or ecological values.[130] Having regard to SPP 1, SPP 2.0 and Guidance Statement No 33, it is Mr Hall's opinion that the Tuart trees have a level of significance as native vegetation which justifies their retention, and that retaining them is more consistent with the principle of sustainability than removing the trees for the extraction of limestone.[131] Mr Hall observed that the subject land would not be sterilised by the retention of the Tuart trees and the imposition of the 30 metre buffer. Mr Hall acknowledged that there would be a reduction in the quantity of limestone that could be removed from the subject land but stages 1 and 2 could continue, as could substantial parts of stages 3 and 4.[132]

Findings – orderly and proper planning

105 Although we accept that due regard should be afforded to the DWER assessment report, we do not accept that we are bound by DWER's findings on the environmental suitability of the proposed clearing. We are required to take into account environmental considerations in making our determination because the planning framework directs us to consider whether a proposed extraction of basic raw materials would be environmentally acceptable.

106 We accept the evidence of Mr Hall, and we find, that the Tuart trees from part of a significant patch of remnant vegetation and that retaining the Tuart trees is more consistent with the principle of sustainability than removing the trees for the extraction of limestone. Balancing the retention of the Tuart trees against the reduced volume of BRM resource to be extracted from the subject land if the Tuart trees were cleared, we find that, due to their significant ecological value, clearing the Tuart trees would not promote the sustainable use and development of the subject land. Consequently, we find that maintaining condition 3 and condition 9 of the approval is consistent with the requirements of orderly and proper planning as enunciated by the Tribunal in ***Mt Lawley*** and by Pritchard J in ***Marshall.***

Conclusion

107 The proposed extraction of limestone from the subject land was granted development approval by the Shire on 29 October 2020. The approval is subject to condition 3 which requires the retention of the Tuart trees with a 30 m buffer from the outer edge of the canopies.

[130] Witness statement of Mr Simon Hall, dated 18 January 2018, paras 30-31.
[131] Witness statement of Mr Simon Hall, dated 18 January 2018, para 32.
[132] Witness statement of Mr Simon Hall, dated 18 January 2018, para 35.

Condition 9 of the approval requires a 30 metre demarcation barrier to be erected from the outer edge of the canopy of the Tuart TEC.

108 We find that the Tuart trees form part of the Tuart TEC. Due to their ecological significance, including their age, size and hollow bearing capacity, we find that clearing them would have a significant impact on the Tuart TEC. Although we are unable to conclude that clearing the Tuart trees would have a significant impact on the present breeding of Black-Cockatoos, due to the size and age of the Tuart trees, suitable nesting hollows may be utilised in the future.

109 The relevant planning framework anticipates that the extraction of basic raw materials will occur in an environmentally acceptable manner. Because of the significant ecological value of the Tuart trees, we find that clearing them would be environmentally unacceptable and inconsistent with the principles of orderly and proper planning. Consequently, we find that condition 3 and condition 9 should be maintained on the approval. Because the Tuart trees form part of the Tuart TEC, we observe that condition 9 requires a suitable demarcation barrier to be erected 30 metres from the outer edge of the canopy of the Tuart trees.

110 Having due regard to the relevant matters in cl 67(2) of the Deemed Provisions, we find that the correct and preferable decision is to dismiss the application under s 252(1) of the PD Act. Accordingly, we will affirm the Shire's decision made on 29 October 2020 in respect of development application for Extractive Industry [Ex/002] (Limestone) at Lot 29 Tredrea Place, Myalup.

Orders

The Tribunal orders:

1. The application is dismissed.

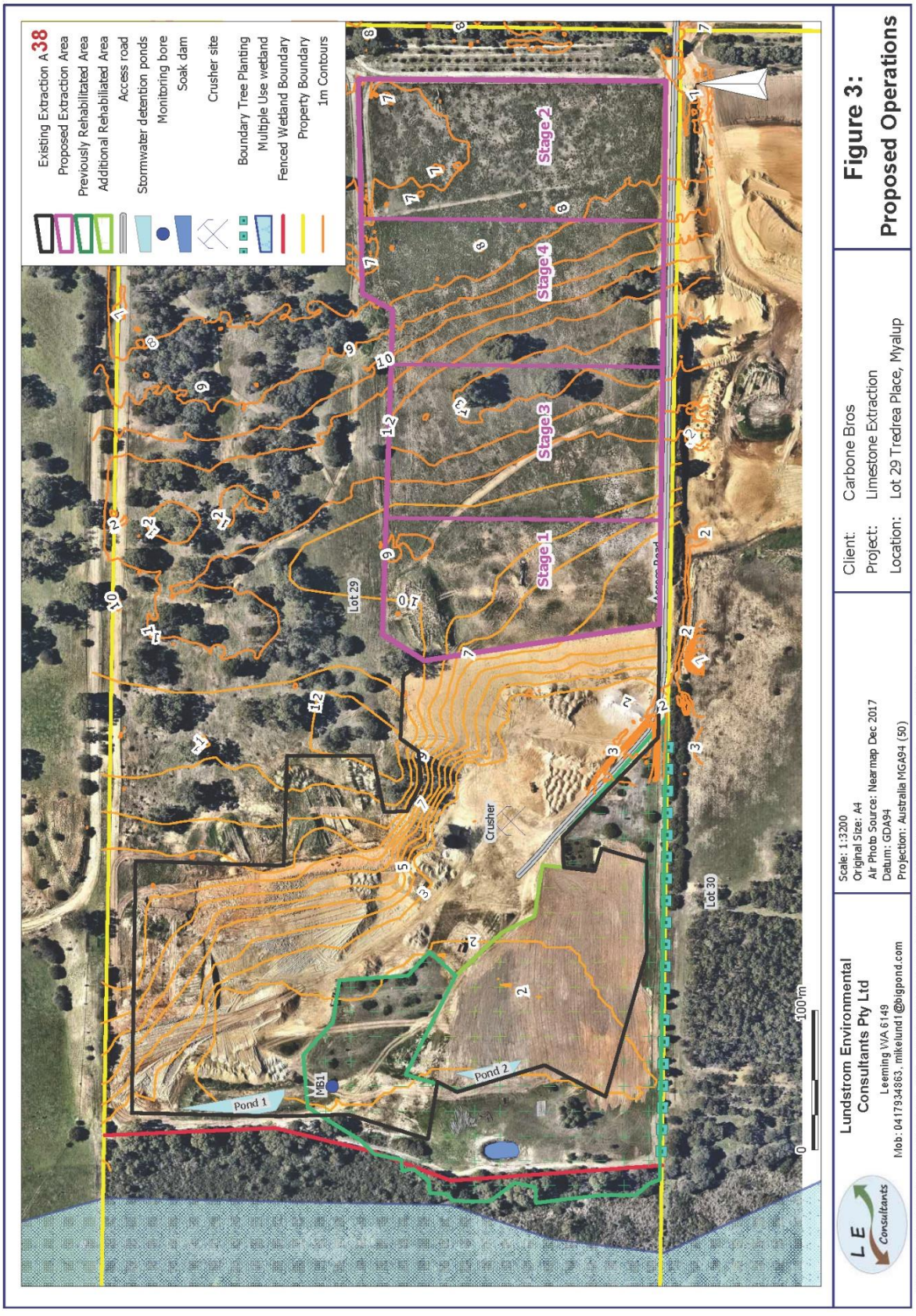
2. The respondent's decision made on 29 October 2020 following reconsideration under s 31 of the *State Administrative Tribunal Act 2004* (WA) in respect of development application for Extractive Industry [Ex/002] (Limestone) at Lot 29 Tredea Place, Myalup, is affirmed.

I certify that the preceding paragraph(s) comprise the reasons for decision of the State Administrative Tribunal.

MS C BARTON, MEMBER

26 NOVEMBER 2021

ANNEXURE A


Existing Extraction A38
Proposed Extraction Area
Previously Rehabilitated Area
Additional Rehabilitated Area
Access road
Stormwater detention ponds
Monitoring bore
Soak dam
Crusher site
Boundary Tree Planting
Multiple Use wetland
Fenced Wetland Boundary
Property Boundary
1m Contours
Stage 1
Stage 2
Stage 3
Stage 4
Lot 29
Lot 30
Pond 1
Pond 2
MB1
Crusher
0
100m
Figure 3:
Proposed Operations
Client: Carbone Bros
Project: Limestone Extraction
Location: Lot 29 Tredrea Place, Myalup
Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863. mikelund1@bigpond.com
Scale: 1:3200
Original Size: A4
Air Photo Source: Nearmap Dec 2017
Datum: GDA94
Projection: Australia MGA94 (50)
Z:\Carbone\Tredrea Place Lot 29_Myalup_SoH_Limestone\2019 Application\Drawings\F3 Lot 29 Tredrea Pl.map
9/10/2019

ANNEXURE B

The Planning Framework

State planning framework

Greater Bunbury Region Scheme

The subject land is zoned 'Rural' under the *Greater Bunbury Region Scheme* (**GBRS**).

Planning and Development (Local Planning Schemes) Regulations 2015 (WA)

Clause 67 in Sch 2 of *the Planning and Development (Local Planning Schemes) Regulations 2015* (WA) (**Deemed Provisions**), sets out the matters to which due regard must be had in considering a development application (to the extent the matter is relevant).

State Planning Policy 1 – State Planning Framework

> **5. General Principles for Land Use Planning and Development**
>
> …
>
> 1. The primary aim of planning is to provide for the sustainable use and development of land.
>
> 2. The State Planning Strategy identifies the six key principles which further define this primary aim and describe the considerations which influence good decision-making in land use planning and development. Each principle includes factors representing good and responsible decision-making in land use planning. Planning should take account of and give effect to, these principles and related policies to ensure integrated decision-making throughout government.

The principles of 'Economy' and 'Environment' are identified as relevant:

> **Economy**
>
> **Principle:**
>
> **Facilitate trade, investment, innovation, employment and community betterment.**
>
> Planning should contribute to the economic well-being of the State, regions and local communities by supporting economic development through the provision of land, facilitating decisions and resolving land use conflicts.

In particular, planning should provide for economic development by:

i. providing suitable zoned and serviced land for industry, business and other employment and wealth generating activities;

ii. protecting agricultural land resources from inappropriate uses;

iii. avoiding land use conflicts by separating sensitive and incompatible uses from industry and other economic activities with off-site impacts;

iv. promoting local employment opportunities in order to reduce the time and cost of travel to work;

v. providing sites for tourism accommodation and facilities taking account of their special location and servicing needs; and

vi. ensuring that plans and policies are clear and certain, decisions are made in accordance with plans and policies, and decisions are made expeditiously.

Environment

Principle:

Conserve the State's natural assets through sustainable development.

The protection of environmental assets and the wise use and management of resources are essential to encourage more ecologically sustainable land use and development. Planning should contribute to a more sustainable future by:

i. promoting the conservation of ecological systems and the biodiversity they support including ecosystems, habitats, species and genetic diversity;

ii. assisting in the conservation and management of natural resources, including air quality, energy, waterways and water quality, land, agriculture and minerals, to support both environmental quality and sustainable development over the long term;

…

iv. adopting a risk-management approach which aims to avoid or minimise environmental degradation and hazards[.]

State Planning Policy 2.0 - Environment and Natural Resources Policy (SPP 2.0)

…

4. OBJECTIVES

The objectives of this policy are:

- to integrate environment and natural resource management with broader land use planning and decision-making;

- to protect, conserve and enhance the natural environment; and

- to promote and assist in the wise and sustainable use and management of natural resources.

5. POLICY MEASURES

The above objectives provide the context for the policy measures which are set out below under the following headings:

- General Measures

…

- Biodiversity

…

- Minerals, Petroleum and Basic Raw Materials

…

5.1 General Measures

The implementation of planning decisions can have an impact on the environment and other natural resources. The following policy measures recognise the significance of natural resources, and should be read in conjunction with the more specific statements on aspects of natural resources that follow. Planning strategies, schemes and decision-making should:

(i) Avoid development that may result in unacceptable environmental damage.

(ii) Actively seek opportunities for improved environmental outcomes including support for development which provides for environmental restoration or enhancement.

(iii) Take account of the availability and condition of natural resources, based on best available information at the time.

(iv) Protect significant natural, indigenous and cultural features, including sites and features significant as habitats and for their floral, cultural, built, archaeological, ethnographic, geological, geomorphological, visual or wilderness values.

(v) Take into account the potential for economic, environmental and social (including cultural) effects on natural resources.

(vi) Recognise that certain natural resources, including biological resources, are restricted to particular areas and that these geographical areas or land types may need to be identified accordingly and appropriate provision made to protect the areas for the use of those resources.

…

(x) Support conservation, protection and management of native remnant vegetation where possible, to enhance soil and land quality, water quality, biodiversity, fauna habitat, landscape, amenity values and ecosystem function.

…

5.5 Biodiversity

…

Planning strategies, schemes and decision-making should:

…

(ii) Seek to avoid or minimise any adverse impacts, directly or indirectly, on areas of high biodiversity or conservation value as a result of changes in land use or development.

…

5.7 Minerals, Petroleum and Basic Raw Material Resources

…

Basic raw materials include sand, clay, hard rock, limestone and gravel together with other construction and road building materials. A ready supply of basic raw materials close to developing areas is required in order to keep down the cost of land development and the price of housing[.]

Planning strategies, schemes and decision-making should:

…

(i) Identify and protect important and economic mineral resources to enable mineral exploration and mining in accordance with acceptable environmental standards.

(ii) Identify and protect important basic raw material resources and provide for their extraction and use in accordance with Statement of Planning Policy No. 10: Basic Raw Materials.

…

(iv) Have regard to the *State Gravel Supply Strategy (1998)*, the draft *Towards a State Lime Strategy (2001)* and any other Government adopted basic raw material or mineral strategy, in considering proposals for the extraction of basic raw materials and mineral resources[.]

State Planning Policy 2.4 - Planning for Basic Raw Materials (SPP 2.4)

…

3. BASIC RAW MATERIALS IN WESTERN AUSTRALIA

BRM are a finite resource and their efficient use is required to ensure an ongoing supply to support economic development in Western Australia. Essential for the construction of buildings, roads, other infrastructure and agricultural production, for the purposes of this policy BRM are:

…

- limestone (including metallurgical limestone)

…

3.1 Supply categories for Basic Raw Materials

This policy recognises the following site categories for BRM:

- Significant Geological Supplies (SGS) - are identified as the highest priority extraction areas for BRM. SGS are BRM identified by the Department of Mines, Industry Regulation and Safety (DMIRS) that represent strategic, long-term supplies of BRM requiring protection.

- Extraction Sites (ES) - comprise all commercial sites from which BRM are extracted, and quarries. These may overlap with SGS areas. ES may include future, proposed, approved and operating commercial extractive industries under the *Planning and Development (Local Planning Schemes) Regulations 2015*, the *Local Government Act 1995*, the *Mining Act 1978* or a combination of these Acts.

The identification of BRM under these categories does not obligate the landowner to extract these resources, nor that government approvals for extraction is guaranteed.

4. APPLICATION OF THIS POLICY

SPP 2.4 should be read in conjunction with the Planning for BRM guidelines (the BRM guidelines). This policy and BRM guidelines apply to the preparation and assessment of planning instruments, including region and local planning schemes; planning strategies, structure plans; subdivision and development proposals in Western Australia where:

(a) proposals are over, or adjacent to, sites identified to contain BRM resources

(b) significant volumes of fill may be required

(c) approval is required for extractive industries under the *Planning and Development Act 2005*

(d) extractive industry proposals are assessed under the Mining Act 1987 and due regard is given to planning instruments by the decision-maker.

This policy is to be considered in conjunction with the interactive geological map GeoVIEW.WA, as well as other relevant legislation and policies as outlined in the associated BRM guidelines.

State Planning Policy 2.5 Rural Planning (SPP 2.5) addresses BRM matters on rural land. Until such time as SPP 2.5 is reviewed, where there is a conflict between SPP 2.5 and this policy in relation to BRM matters, this policy prevails to the extent of any inconsistency.

…

5. POLICY OBJECTIVES

The objectives of this policy are to:

(a) ensure BRM and its regional importance is considered at the earliest stages of the planning process;

(b) protect BRM in SGS areas and ES by avoiding encroachment from incompatible land uses;

(c) ensure BRM resources are used efficiently in land use planning and development;

(d) identify BRM extraction opportunities through sequential land use without compromising the final intended land use; and

(e) ensure the extraction of BRM avoids, minimises or mitigates any adverse impacts on the community, water resources and biodiversity values.

6. POLICY MEASURES

Planning decisions that impact on, or are impacted by, BRM operations should comply with the following measures.

6.1 Higher order strategic planning instruments

Higher order strategic planning documents such as region schemes, regional and sub-regional frameworks, their amendments, plus sub-regional and district structure plans should, where appropriate:

(a) identify SGS areas as the primary sources for BRM and define known exclusion areas;

(b) avoid and/or minimise the potential negative impacts on amenity and the environment arising from an extractive industry, when identifying areas for future growth;

(c) avoid and/or minimise encroachment on identified BRM resources and extractive industry operations when identifying areas for future growth;

(d) identify opportunities for the extraction of BRM from SGS areas followed by sequential urban or industrial development, where appropriate. There is a presumption against region scheme amendments until it is demonstrated how sequential land use will be achieved where a BRM resource has been identified; and

(e) seek to locate new urban and industrial areas on land where the need for additional imported fill is minimised.

…

6.5 Development approval and management plans

Unless exempt, applications to establish, extend or expand an extractive industry require development approval under an applicable local planning scheme. Applications for development approval should be supported by a management plan that demonstrates:

…

(c) identification of the environmental values and those requiring protection;

…

SPP 2.4 - Planning for Basic Raw Materials Guidelines

1 INTRODUCTION

These guidelines should be read in conjunction with *State Planning Policy 2.4 Planning for Basic Raw Materials* (SPP 2.4).

1.1 Purpose

These guidelines provide support for decision-making authorities, proponents and referral agencies to implement SPP 2.4. Specifically, they assist in:

1. guiding the appropriate land use planning practices and development approval requirements in relation to Basic Raw Materials (BRM) across Western Australia by specifying requirements to be met during planning and development processes; and

2. ensuring that necessary BRM management measures are incorporated into land development.

…

2.3 Map of Significant Geological Supplies

In order to assist with planning for BRM extraction, the identification of BRM resources has been undertaken by the State Government for the regions of Western Australia where BRM is in high demand. SGS areas have been mapped based on the quality and quantity of BRM and are the highest priority for BRM extraction. Boundaries of SGS are often indicative.

…

Decision-makers should have due regard for BRM mapping. …

…

PART 1 - GUIDANCE FOR PLANNING AUTHORITIES

3 BASIC RAW MATERIALS GUIDANCE FOR PLANNING PROPOSALS

…

3.1 Higher order strategic planning instruments

Higher order strategic planning documents include region schemes and their amendments, regional and subregional frameworks, sub-regional and district structure plans.

Higher order strategic planning instruments should identify SGS areas and minimise the potential for amenity and environmental impacts arising from an extractive industry. …

…

In the Greater Bunbury region, the Greater Bunbury Region Scheme identifies areas of known minerals and basic raw materials, as well as areas constrained for extraction and others designated as strategic resource areas.

…

3.2 Local planning instruments

…

To inform local planning, local governments are encouraged to map approved extraction sites and identified BRM resources to help avoid future land use conflicts. This will also ensure the protection of SGS areas and protect regional and locally significant areas of biodiversity and environmental value.

…

4 ASSESSMENT OF PROPOSALS FOR EXTRACTIVE INDUSTRIES

Assessment of proposals to establish, extend or expand an extractive industry, as well as managing the potential impacts of the operation, should consider the following:

…

(c) prioritisation of proposals within SGS areas aligned with DMIRS GeoVIEW.WA mapping in Perth and Peel;

(d) if the resource is identified as a SGS area and/or local basic raw material demand;

…

(k) the effect of the proposed extractive industry on any native flora and fauna and general landscape values;

…

(m) potential impacts on fragmentation and connectivity of remnant vegetation;

…

4.4 Conservation values

BRM extraction proposals with potential environmental impacts should be referred to the Department of Biodiversity, Conservation and Attractions (DBCA) for advice.

…

4.4.3 Native flora and fauna

BRM operations have the potential to disturb native vegetation and fauna, spread weeds and dieback. Pit design should seek to minimise and mitigate detrimental impacts on any native flora and fauna including the fragmentation of remnant vegetation.

Proposals which potentially impact on biodiversity may need the following additional approvals:

- clearing permit under Part V Division 2 of the *Environmental Protection Act 1986* from DWER (freehold land) or DMIRS (Crown land);
- authority to impact to threatened flora, fauna and ecological communities under the *Biodiversity Conservation Act 2016* from DBCA; and/or
- referral of impacts to Matters of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act 1999* to Department of Agriculture, Water and the Environment (DAWE).

…

PART 2 – GUIDANCE FOR PROPONENTS

…

5.2 Site selection considerations

SGS areas have been identified by DMIRS as the highest priority areas for BRM extraction. BRM extraction within SGS areas is therefore preferred, however extraction can also occur outside SGS areas, subject to approvals and licensing.

…

5.4 Environmental and natural resource considerations

DWER and DBCA are the primary contacts for environmental advice in relation to site selection, protection of environmental assets (wetlands, waterways, native vegetation, threatened ecological communities and DBCA-managed lands) plus the management of water quality impacts including groundwater vertical separation.

It is important to establish what approvals will be required in terms of clearing vegetation, impacts on threatened flora, fauna or ecological communities, industry license or works approval; licence to take water and water resource management issues, including groundwater separation requirements.

Proponents establishing a BRM operation in an area with existing vegetation may require a vegetation clearing permit under the *Environmental Protection Act 1986* issued by DMIRS (Crown land) or DWER (freehold land)[.]

State Planning Policy 2.5 – Rural Planning (SPP 2.5)

…

2 POLICY INTENT

The purpose of this policy is to protect and preserve Western Australia's rural land assets due to the importance of their economic, natural resource, food production, environmental and landscape values. Ensuring broad compatibility between land uses is essential to delivering this outcome.

…

4 POLICY OBJECTIVES

The objectives of this policy relevant in this case are:

…

(c) outside of the Perth and Peel planning regions, secure significant basic raw material resources and provide for their extraction;

….

(g) protect and sustainably manage environmental, landscape and water resource assets.

5 POLICY MEASURES

The WAPC seeks to protect and preserve rural land for rural purposes including primary production, basic raw materials, regional facilities, and protection of biodiversity and landscape. Rural land accommodates a diverse range of land uses, primarily associated with primary production. There are also rural areas with suitable soils, climate, water (rain or irrigation) and access to services such that the land is considered to be high quality agricultural land. The intent of this policy is therefore to protect rural land and encourage a diversity of compatible rural land uses.

….

5.9 Basic raw materials outside the Perth and Peel planning regions

Basic raw materials are essential for the construction of buildings, roads and other infrastructure, and also for the sustainability of agricultural production.

Identification of basic raw material sites does not presume that extraction would be environmentally acceptable or that subsequent approval for extraction would be guaranteed. Nor does it remove the requirement of local government authorities or proponents to meet their obligations to identify those environmental constraints which may determine the extent and/or manner in which a proposal may be implemented.

WAPC policy for basic raw materials located outside the Perth and Peel planning regions is:

(a) Significant Geological Supplies and their buffers are not to be developed for other purposes until the resource is extracted, or unless development is compatible with the future extraction of the resource;
(b) Significant Geological Supplies and significant basic raw material resources, and an indicative separation distance or buffer, should be identified in subregional and/or local planning strategies;

(c) region and local planning schemes should identify Significant Geological Supplies and significant basic raw material resources, and include provisions for their protection, access and use;

(d) basic raw material resources and sites should be identified in local planning strategies and schemes as required;

(e) region and local planning schemes should not generally prohibit the extraction of basic raw material resources;

(f) sequential land use planning is encouraged whereby extraction and appropriate rehabilitation can take place on a programmed basis in advance of longer-term use and development;

…

(h) where a basic raw material resource is located with native vegetation or significant biodiversity values, extraction of the resource may require referral under Part IV or Part V of the *Environmental Protection Act 1986*. Environmental regulation of the proposal may require vegetation retention and/or protection of other environmental assets;

(i) planning decision-makers are to have due regard to advice from environmental agencies and consider potential impacts on fragmentation and connectivity of remnant vegetation; and

…

GBRS Strategic Minerals and Basic Raw Materials Resource Policy 2018

1. Introduction

1.1 Minerals and basic raw materials are important commodities for the Western Australian economy. Mining is a key economic driver in the State. It is a major source of employment and has a significant flow-on effect to other sectors of the economy, particularly manufacturing and resource processing. Basic raw materials are essential products for local construction, road building and agriculture.

…

1.3 This policy also has regard to the principles of *State Planning Policy 2.5*: Rural Planning which sets out matters to be considered by the Western Australian Planning Commission (WAPC) and local governments outside of the Perth and Peel planning regions for zoning, subdivision and development applications for extractive industries, and in the vicinity of identified basic raw material resource areas.

…

1.5 Identification of strategic resources does not presume that extraction would be environmentally acceptable or that subsequent approval for extraction would be guaranteed. Nor does it remove the requirement of local authorities or proponents to meet their environmental obligations to identify those environmental constraints that may determine the extent and/or manner in which a proposal may be implemented

4. Objectives

4.1 To identify land within the GBRS area that contains mineral resources and basic raw materials of State or regional significance.

…

4.3 To encourage the mining of strategic resources in accordance with acceptable environmental standards.

…

5. Policy statement

…

5.10 Where a strategic resource is located with native vegetation or significant biodiversity values, extraction of the resource may require referral under Part IV

or Part V of the Environmental Protection Act 1986. Environmental regulation of the proposal may require vegetation retention and/or protection of other environmental assets.

5.11 Planning decision-makers are to give due regard to advice from environmental agencies and consider potential impacts on fragmentation and connectivity of remnant vegetation.

Draft Bunbury-Geographe sub-regional planning strategy (November 2020)

(**Note**: The Draft Bunbury-Geographe sub-regional planning strategy was released by the WAPC in November 2020 and advertised. Submissions closed on 12 February 2021).

1.2 Purpose

The Western Australian Planning Commission's *State Planning Policy 1: State Planning Framework* establishes that sub-regional strategies guide change and provide a basis for cooperative action to be taken by the State and local governments on land use and development.

The primary purpose of this Strategy is to plan for and manage growth in the Bunbury-Geographe subregion. It does this by:

- establishing a **vision to 2050** to guide land use planning, expressing an agreed aspiration for the future of the sub-region, in the context of the State Planning Framework
- identifying **strategic directions** and **actions** required to implement the vision
- reaffirming the **status of Bunbury** as the State's second city
- defining the sub-region's **settlement hierarchy**
- identifying future **land requirements** for urban, industrial, commercial and other purposes
- directing the **sequencing of future development** to inform and support the preparation of amendments to the Greater Bunbury Region Scheme and local planning schemes
- providing a strategic context for **local governments** in preparing, reviewing and implementing local planning frameworks
- **profiling** the sub-region's urban settlements, transport networks, economy, environment and utilities/services.

…

3.2.4 Target population

The Strategy does not predict an average annual growth rate or estimate a population size at a specific time. Rather, it recognises the aspiration for Bunbury-Geographe to

reach its full potential, which would likely see the sub-region's population grow towards 200,000 over the next 20-30 years.

The Strategy therefore adopts 200,000 as a target population. …

…

17.6 Basic raw materials

Basic raw materials (BRM) include sand, limestone, gravel, clay, gypsum and other construction and road building materials. The materials are finite and as the supply becomes more problematic, costs will rise, thereby increasing the cost of development including housing.

These materials are required for a number of uses with most relating to the construction industry including buildings, fill, roads and retaining walls. It is important to have access to local sources as this reduces costs and pollution associated with their transport.

…

The remaining extraction sites are administered by the various local governments under the Planning and Development Act 2005. In 2012 the then Department of Planning and WAPC prepared a *Basic Raw Materials Demand Study for the Bunbury and Busselton Region* (the Study), which identified the main BRM deposits and estimated future demand. The Study identifies a number of regionally-significant deposits that need protection from potential land uses that would restrict future extraction of these resources.

Demand for BRM in the Perth and Peel regions is expected to remain high, while access to deposits in those regions is expected to diminish. This is likely to have the effect of increased competition from Perth and Peel urban developments for access to BRM from the South West region. This could potentially have a major impact on the future growth in the sub-region, unless alternatives supplies can be found, or alternative building construction methods are embraced, particularly lightweight construction techniques[.]

Local Planning Framework

Shire of Harvey District Planning Scheme No 1 (DPS 1)

Within the General Farming zone of DPS 1, the use class extractive industry is an SA use, meaning that the local government may, at its discretion, permit the use after notice of the application has been given in accordance with cl 64 of the Deemed Provisions.

1.6 SCHEME OBJECTIVES

1.6.1 The objectives of the Scheme are:

(a) to encourage and control the continued orderly development of land within the Shire in a manner that enhances the quality of life of the Shire community;

(b) to ensure that the existing standard of roads water supply, effluent disposal, electricity supply and other community services are sufficient for the additional demands proposed development would create;

(c) to promote economic development and tourism within the Shire and increase local employment opportunities;

(d) to provide opportunities for a wide range of lifestyles providing areas for urban and rural living;

(e) to retain the pre-eminence of agriculture, and restrict development that detracts from the potential of significant agricultural land;

(f) to preserve and enhance places of natural beauty particularly along the coast, the rivers and inlets and the scarp, and to preserve historic buildings and objects of historical and scientific interest; and

(g) to protect and preserve the more important natural flora and fauna habitats (ecosystem, biodiversity and essential ecological processes), and other environmentally sensitive areas that are prone to degradation on the principle that the extent and manner of use of these areas should be kept within their capabilities of being sustained without degradation in the long term.

1.6.2 In considering applications for development approval, subdivision or amendments to this Planning Scheme the local government shall have regard to the above objectives.

…

8.1 PLACES OF LANDSCAPE VALUE – DEVELOPMENT REQUIREMENTS

8.1.1 The places and buildings described in Schedule 1 and situated on the lands shown as a Place of Landscape Value on the Scheme Maps are considered by the local government to be of scenic or other value and should be retained in their present state, or restored to their original state, or to a state acceptable to the local government.

Specific policies relating to Places of Landscape Value are outlined in Schedule 2.

8.1.2 A person shall not without the special approval of the local government at or on a place of landscape value carry out any development including, but without limiting the generality of the foregoing:

(a) the erection, demolition or alteration of any building or structure (not including farm fencing, wells, bores or troughs and minor drainage works ancillary to the general rural pursuits of the locality);
(b) the removal of trees associated with established buildings;
(c) the erection of advertising signs; and
(d) the clearing of native vegetation

SCHEDULE 2 – POLICIES FOR PLACES OF LANDSCAPE VALUE

Clause 8.2 Applies

2.1 AREA 2 – COASTAL LAKELANDS

…

2.1.3 In determining areas where development may occur or in considering proposals, the Local government will take account of the following criteria:

(i) areas with a higher capacity for development should be intensively developed and should attract users away from those areas less well equipped to absorb pressure of use;
(ii) areas of particularly high wildlife potential should be as inaccessible as possible to the general public and should not be developed for human use;
(iii) areas surrounding development areas which in an undeveloped form have such high intrinsic landscape value that they will attract use, must be taken into account when designing the development area so that pressure of use does not destroy the character of the surrounding area;
(iv) areas with a low level of soil and or vegetation stability should be avoided;
(v) the Old Coast Road should be seen as a visual corridor and remain a tourist route and the Local government will not permit a roadhouse, within 20km of an existing development of that nature;
(vi) development areas must be of a physical character that new buildings and associated paraphernalia will be camouflaged by natural vegetation or topographic features. Standing timber should be retained whenever possible, so that only those trees directly and inevitably threatened by development may be removed with the consent of the Local government; and
(vii) where roads are needed to service areas of foreshore they should approach at right angles orientated away from the prevailing winds and located along the base of dunes and meet the foreshore at places suitably equipped to absorb the intensified pressure of use. Roads should not run parallel or adjacent to foreshores.

The standard of access road should be commensurate with the activity potential of the area and the ultimate size of the settlement.

Penetration of the countryside by the motor car should be restricted and minimised. Clearly developments have to be serviced, but the main design criteria must be the landscape, and not the engineering ideals of traffic management.

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WESTERN AUSTRALIAN PLANNING COMMISSION

STATEMENT OF PLANNING POLICY No. 2

ENVIRONMENT AND NATURAL RESOURCES POLICY

PREPARED UNDER SECTION 5AA OF THE TOWN PLANNING AND DEVELOPMENT ACT 1928

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WESTERN AUSTRALIAN PLANNING COMMISSION

STATEMENT OF PLANNING POLICY No. 2

ENVIRONMENT AND NATURAL RESOURCES POLICY

PREPARED UNDER SECTION 5AA OF THE TOWN PLANNING AND DEVELOPMENT ACT 1928

1. CITATION

This a Statement of Planning Policy made under Section 5AA of the *Town Planning and Development Act 1928*. This policy may be cited as the Statement of Planning Policy: Environment and Natural Resources Policy.

2. INTRODUCTION AND BACKGROUND

Western Australia is one of the most biologically diverse regions in the world, home to a broad range of ecological communities and species, and natural landscapes. The State's vast areas encompass rich and extensive agricultural, pastoral, marine and mineral resources. The protection and wise management of the environment and natural resources of the State are of paramount importance if we are to maintain our lifestyle now and into the future. This requires acknowledgement of the intrinsic value of the environment, as well as an understanding of the importance of ecological processes in the production and maintenance of healthy soils, clean air and water: the natural resource base which supports life and our lifestyle. It is therefore essential to resolve land use conflicts between use and protection of natural resources, having consideration of potential impacts on the environment, as well as those on community lifestyle and the economy.

The concept of sustainability in terms of our natural environment and resources is established in the *State Planning Strategy* (1997), which is directed towards ensuring a balance between economic growth and the conservation and enhancement of our natural environment in order to provide a better quality of life for the present and into the future. The concept of sustainability is further refined in the draft *Western Australian State Sustainability Strategy* (2002) as meeting the needs of current and future generations through simultaneous environmental, social and economic improvement.

The Sustainability Strategy vision for Western Australia in terms of the sustainable use of natural resources is: 'Western Australia's vast landscape and seascape, intricate web of biodiversity and other natural resources are managed and used sustainably for the common good and the community is involved in management and planning processes that are transparent and visionary'. This focus on sustainability reflects national agreements such as the *National Strategy for Ecologically Sustainable Development* (1992) and the *National Strategy for the Conservation of Australia s Biological Diversity* (1996). As well, there are global obligations to protect natural resources through international treaties.

The key to sustainability in the planning sector is integrating ecological, economic and social considerations into decision-making. This policy sets out the key principles of how this can be done with environment and natural resource issues.

In order to meet the objectives of sustainability, there is a clear need to protect our land, air and water, vital resources that support our diverse range of flora, fauna and ecosystems, from unacceptable levels of loss or degradation. This involves the maintenance of vital ecological processes and systems on which life depends, and an understanding of how these complex systems, our natural resources, interact within Western Australia.

The *Environment Western Australia 1998: State of the Environment Report* (1998) and subsequent updates describe the condition of the environment and natural resource use sectors, including associated pressures. The report prioritises specific environmental issues in terms of environmental status and proposes responses to these, including the identification of environmental indicators for each of the important environmental issues.

The draft *Western Australian State Sustainability Strategy* (2002) reaffirms the proposals of the *Government Framework to Assist in Achieving Sustainable Natural Resource Management in Western Australia* (1999) in the need for an integrated and co-ordinated approach to the management of natural resources in the State. It proposes a framework of principles, visions and actions to develop effective partnerships between all stakeholders including the community, industry, and local government. It also recognises that local government and State government statutory planning powers can be used to implement natural resource and environmental issues. The Western Australian Planning Commission (WAPC) acknowledges the role given to Regional Groups in the Cabinet endorsed Natural Resource Management Framework, and is committed to assisting these groups to achieve government policy objectives.

Careful assessment will be required to resolve conflicts between land use and protection of natural resources, giving consideration to potential impacts on the environment, community lifestyle preferences, and economic values. This requires an understanding of the competing pressures of development and environmental protection, together with the economics of sustainable land use and management practices,

advances in technology, and the priorities of the community. Land use planning decisions will often seek to minimise trade-offs in order to achieve the best outcome for the community, the environment and the economy.

Integrated land use planning and management is a practical way to achieve effective and efficient use of the natural resources of the State. There is a clear and explicit need to incorporate environmental considerations and resource management into the planning process to ensure that decisions are made in the context of potential impacts on the environment and our natural resources. In the same way, it is possible for more use to be made of the planning system in managing these issues. It is possible to achieve land use change and development that have positive environmental outcomes or that reduce the degree of negative impact on the environment.

The Environment and Natural Resources (ENR) policy is a broad, sector issue policy under *Statement of Planning Policy No. 8: State Planning Framework Policy*. It defines the principles and considerations that represent good and responsible planning in terms of environment and natural resource issues within the framework of the State Planning Strategy. The ENR policy will be supplemented by more detailed planning policies on particular natural resources matters that require additional information and guidance. These supplementary policies may also be Statements of Planning Policy and should be implemented in conjunction with this policy.

3. APPLICATION OF THE POLICY

The policy applies throughout Western Australia.

4. OBJECTIVES

The objectives of this policy are:

- to integrate environment and natural resource management with broader land use planning and decision-making;
- to protect, conserve and enhance the natural environment; and
- to promote and assist in the wise and sustainable use and management of natural resources.

5. POLICY MEASURES

The above objectives provide the context for the policy measures which are set out below under the following headings:

- General Measures
- Water Resources
- Air Quality
- Soil and Land Quality
- Biodiversity
- Agricultural Land and Rangelands
- Minerals, Petroleum and Basic Raw Materials
- Marine Resources and Aquaculture
- Landscapes
- Greenhouse Gas Emissions and Energy Efficiency

5.1 General Measures

The implementation of planning decisions can have an impact on the environment and other natural resources. The following policy measures recognise the significance of natural resources, and should be read in conjunction with the more specific statements on aspects of natural resources that follow.

Planning strategies, schemes and decision-making should:

(i) Avoid development that may result in unacceptable environmental damage.

(ii) Actively seek opportunities for improved environmental outcomes including support for development which provides for environmental restoration or enhancement.

(iii) Take account of the availability and condition of natural resources, based on best available information at the time.

(iv) Protect significant natural, indigenous and cultural features, including sites and features significant as habitats and for their floral, cultural, built, archaeological, ethnographic, geological, geomorphological, visual or wilderness values.

(v) Take into account the potential for economic, environmental and social (including cultural) effects on natural resources.

(vi) Recognise that certain natural resources, including biological resources, are restricted to particular areas and that these geographical areas or land types may need to be identified accordingly and appropriate provision made to protect the areas for the use of those resources.

(vii) Take account of the potential for on-site and off-site impacts of land use on the environment, natural resources and natural systems[1].

(viii) Safeguard and enhance areas of environmental significance on the coast including the marine environment.

(ix) Ensure use and development on or adjacent to the coast is compatible with its future sustainable use for conservation, recreation and tourism in appropriate areas.

(x) Support conservation, protection and management of native remnant vegetation where possible, to enhance soil and land quality, water quality, biodiversity, fauna habitat, landscape, amenity values and ecosystem function.

(xi) Consider alternatives to land acquisition for conservation and landscape protection where limited or no public access is required.

(xii) Take into account the potential for impacts from changes in climate and weather on human activities and cultural heritage including coastal and urban communities, natural systems and water resources.

(xiii) Consider any relevant accredited Natural Resource Management Regional Strategy, or catchment management strategies prepared by catchment groups and endorsed by State government agencies, with a view to integrating implementation of appropriate and relevant parts through town planning schemes and assessment of developments.

5.2 Water Resources

Water is fundamental to human life and the environment. The careful management of water resources, both in terms of quantity and quality, is therefore essential to support natural ecosystems as well as future growth and development. This includes water catchments, waterways, wetlands, estuaries and the marine environment.

The State *Water Quality Management Strategy for Western Australia* (2001) (SWQMS) is the State framework for implementation of the *National Water Quality Management Strategy* (1994) (NWQMS). The prime objective of the NWQMS is 'to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development.' This ENR Policy is thus consistent with the guiding principles of the NWQMS and the SWQMS, as well as the *Wetlands Conservation Policy for WA* (1997), which aims to prevent further loss or degradation of valuable wetlands in Western Australia.

Planning strategies, schemes and decision making should:

(i) Consider mechanisms to protect, manage, conserve and enhance:
- a. wetlands of importance, Ramsar wetlands and wetlands identified in any relevant *Environmental Protection Policy;*
- b. waterways;
- c. estuaries;
- d. marine environments;
- e. gazetted public drinking water source areas; and
- f. other water sources which sustain catchments and identified environmental values.

(ii) Take account of the availability of water resources to ensure maintenance of water quality and quantity for existing and future environmental and human uses.

(iii) Encourage urban water management through water sensitive design approaches that better manage stormwater quality and quantity; that reduce the impact of stormwater flows to streams, wetlands and coastal waters; and that control or remove pollutants and nutrients so as to improve water quality, retain habitats, conserve water and provide for recreational opportunities and conservation functions through multiple use drainage systems.

(iv) Ensure the provision of adequate setbacks between development and the foreshores of wetlands, waterways, estuaries and the coast, in order to maintain or improve the ecological and physical function of water bodies. Such setbacks will aim to maintain the natural drainage function, protect wildlife habitats and landscape values, lessen erosion of banks and verges, and facilitate filtration of sediment and waste associated with surface run-off from adjacent land uses, which may include retention or replacement of riparian vegetation.

[1] This includes threatening processes, which are processes which threaten or may threaten the survival, abundance or evolutionary development of a native species or ecological community. The Commonwealth's *Environmental Protection and Biodiversity Conservation Act 1999* provides for the identification and listing of key threatening processes such as dieback, land clearance or predation by feral cats.

(v) Consider flood risk by identifying floodways and land affected by 1 in 100 year flood events and avoid intensifying the potential for flooding as a result of inappropriately located land uses and development.

(vi) Consider the risks associated with nuisance or disease vector insects, in particular mosquitoes and midges, and ensure appropriate measures are applied to manage potential conflicts with community amenity and health, and environmental values.

5.3 Air Quality

Air quality is a local, national and global concern. At the global scale, the key natural resource management issues are the emission of greenhouse gases, which has been linked to climatic changes, primarily in temperature and rainfall, and the depletion of the stratospheric ozone layer that affects the amount of ultraviolet light reaching the Earth.

Regional and local air quality problems are primarily the result of industrial and domestic emissions, vehicle use and land use practices such as agriculture and forestry. In Western Australia the key regional and local air quality issues are photochemical smog and haze from particulates (solid and liquid), sulphur dioxide, dust and air toxics.

Western Australia has adopted the *National Environmental Protection Measure for Ambient Air Quality* (1998) which sets air quality standards for each major air pollutant. The *Air Quality Management Plan for Perth* (2000) proposes to address issues of air quality in Perth through a number of strategies including better integration of land use and transport planning.

Planning strategies, schemes and decision-making should:

(i) Promote urban development patterns, densities and form that support reduced travel demand, increased availability and access to public transport and that encourage walking and cycling.

(ii) Have regard to the potential for conflict between sensitive land uses and activities with air emission impacts.

(iii) Have regard to the relevant requirements of the *National Environmental Protection Measure for Ambient Air Quality* (1998), the *Environmental Protection (Kwinana) (Atmospheric Waste) Policy* (1992), the *Environmental Protection (Goldfields residential areas)(sulphur dioxide) Policy* (1992) and *Statement of Planning Policy No. 4: State Industrial Buffer Policy.*

5.4 Soil and Land Quality

Land is an essential physical and economic resource, which is fundamental to the existence of flora and fauna and is essential to maintaining biodiversity. Changes in the environment, such as extensive land clearing for agriculture and settlement, and intensification of land use, can have a profound effect on land quality by removing its protective cover and creating the potential for erosion, salinity and loss of soil and water quality. Land is used for a variety of purposes. Careful consideration is necessary to ensure land is allocated to appropriate uses that minimise land degradation and resource use conflicts. Specific consideration should be given to land capability and suitability, and exploration of different options for use when decisions are made about the future use and development of land. Soil contamination, wind and water erosion, acidity, loss of soil cover and biodiversity, water logging and salinity are particular issues requiring attention.

The *Report of the Salinity Taskforce* (2001) and the *Government Response to the Salinity Taskforce Report: Salinity: a new balance* (2002) set out a strategy to manage salinity and outline the management options and tools that are available to landholders across the south-west agricultural zone. It highlights the need for urgent and large-scale intervention on the hydrological system if the Strategy's goals are to be achieved. This policy is consistent with the goals and strategic approach of the Salinity Taskforce.

Planning strategies, schemes and decision-making should:

(i) Have regard to the capability of land to accommodate different land uses and developments, including erosion hazard, the absorptive capacity of soils, slope stability, potential for variable settlement or subsidence, active fault lines and dune migration.

(ii) Recognise and consider land that is degraded or contaminated, or has the potential to become so, and facilitate its rehabilitation or remediation for appropriate future use.

(iii) Ensure that land uses that may result in land contamination such as storage of chemicals, waste, other toxic materials or liquid fuel are not permitted unless it can be demonstrated that the proposed activities will not result in contamination of land or adverse effects on future land use.

(iv) Identify existing and potential areas affected by salinity, acid sulphate soils or other severe land degradation problems and, where appropriate, facilitate measures such as promoting vegetation retention, replanting in groundwater recharge areas, and prevention of inappropriate development, in order to reduce impacts on land, buildings and infrastructure.

5.5 Biodiversity

Biodiversity describes the variability among living organisms from all sources (including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part) and includes diversity within and between species and the diversity of ecosystems.[2]

Biological diversity underpins ecological processes essential for maintenance of marine and estuarine quality, soil fertility and clean, fresh water and air. Biodiversity is also fundamental to the quality and character of the landscape and in providing recreational opportunities, aesthetic value and cultural identity. Planning should recognise the State's biodiversity in considering changes of land use, including consideration of any future potential value, such as for medicinal purposes or as a source of genetic material.

The protection and enhancement of biodiversity is guided by the *National Strategy for the Conservation of Australia's Biological Diversity* (1996) and the *National Objectives and Targets for Biodiversity Conservation 2001-05.* There are also a number of statutory and non-statutory mechanisms designed to protect, manage and conserve areas identified as of high State, regional or local biodiversity value for Western Australia.

Planning strategies, schemes and decision-making should:

(i) Consider mechanisms to protect areas of high biodiversity and/or conservation value, including:
   a. land vested in the Conservation Commission as national park, nature reserve, conservation park or other reserve, and land acquired and managed by the Department of Conservation and Land Management (CALM) pending formal reservation;
   b. land and waters vested in the Marine Parks and Reserves Authority as marine park, marine nature reserve or marine management area, and areas identified in the *Report of the Marine Parks and Reserves Selection Working Group*;
   c. land identified as a Biosphere Reserve under the UNESCO Man and Biosphere program;
   d. land containing Threatened Flora or Threatened Ecological Communities (CALM database) or that which is habitat to Threatened Fauna;
   e. regionally significant vegetation within the Swan Coastal Plain area of the Perth Metropolitan Region as identified in *Bush Forever* (2000);
   f. areas formally recognised as having significance for conservation or biodiversity values by the State Government as identified in management plans under the *Conservation and Land Management Act* (1984), the *Regional Forest Agreement* (1999), regional planning strategies, the Environmental Protection Authority (1976-1983) *Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority [Systems 1 to 12]* as updated from time to time, and other relevant plans and strategies;
   g. Ramsar wetlands and wetlands recognised as habitat for migratory species;
   h. nationally significant wetlands listed in the *Directory of Important Wetlands in Australia* (2001);
   i. wetlands identified in any relevant Environmental Protection Policy (EPP), such as the Swan Coastal Plain Lakes EPP and the South-West Agricultural Zone EPP; and
   j. areas listed on the World Heritage List.

(ii) Seek to avoid or minimise any adverse impacts, directly or indirectly, on areas of high biodiversity or conservation value as a result of changes in land use or development.

(iii) Assist in establishing a comprehensive, adequate and representative conservation reserve system throughout the State for flora, fauna habitat, landscapes, waterways, estuaries and wetlands.

(iv) Safeguard and enhance linkages between terrestrial and aquatic habitats which have become isolated, including the re-establishment of habitat corridors.

(v) Assist the return of areas of high biodiversity conservation value to the public estate or otherwise ensure the protection of high biodiversity conservation values through mechanisms including planning controls or conservation covenants.

(vi) Support the use of management plans to protect areas of high biodiversity conservation value in the long term.

5.6 Agricultural Land and Rangelands

Western Australia contains large areas devoted to agricultural pursuits such as livestock, cropping and horticulture, as well as pastoral grazing on the arid and semi-arid rangelands of the north. These natural resource assets require consideration in terms of ecological diversity and the environment, as well as the social and cultural values of communities.

[2] Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

In the more remote parts of the State, social issues such as rural decline is increasing the pressure on natural resources, as a community's capacity for management decreases whilst requirements to intensify agricultural activities are increased.
The rangelands cover over 85% of Western Australia and contain essential elements of the State's biological diversity. Only about 2% of Western Australia's population lives in these arid and semi-arid lands. Pastoralism is by far the most extensive use, although these lands produce the majority of the State's mineral and energy wealth.
Productive agricultural land is a finite resource that must be managed sustainably for the long term. Planning should ensure that the State's agricultural base is protected from the unplanned loss of high quality productive agricultural land due to permanent changes of land use, and maximise the potential of productive farm land which is of high quality and strategic significance in the State, regional and local context. The *Statement of Planning Policy No. 11: Agricultural and Rural Land Use Planning Policy* requires identification and protection of agricultural areas of State, regional and local significance through identification in regional planning schemes, local planning strategies and town planning schemes.
Planning strategies, schemes and decision-making should:

(i) Protect and enhance areas of agricultural significance, having regard to State, regional and local issues and characteristics, and to the requirements of *Statement of Planning Policy No. 11: Agricultural and Rural Land Use Planning*.
(ii) Consider the natural resource capability of rangelands and agricultural lands.
(iii) Diversify compatible land use activities in agricultural areas and rangelands based on principles of sustainability and recognizing the capability and capacity of the land to support those uses.

5.7 Minerals, Petroleum and Basic Raw Material Resources

Mineral resources, petroleum resources and basic raw materials are important natural resource assets and are a vital part of the economy, contributing 30% to Western Australia's gross domestic product. Mineral production is very diverse with over 50 different minerals in commercial production. The main minerals produced are iron ore, gold and alumina which, with petroleum, provide 80% of the total minerals mined in Western Australia. Mineral exploration is managed under the *Mining Act 1978*.
The Western Australian Petroleum Industry accounts for a substantial portion of the State's earnings from resources development. Onshore gas fields and pipelines carrying gas to domestic markets, processing plants and other industrial sites, require protection in the form of setback distances and dedicated easements, that safeguard the infrastructure and the safety of local communities. The activities of the oil and gas industries are administered by the Department of Mineral and Petroleum Resources, using petroleum legislation and regulations.
Basic raw materials include sand, clay, hard rock, limestone and gravel together with other construction and road building materials. A ready supply of basic raw materials close to developing areas is required in order to keep down the cost of land development and the price of housing. The extraction of basic raw materials on Crown land is covered by the *Mining Act 1978* while quarrying of basic raw materials on private land is administered by local government.
Planning strategies, schemes and decision-making should:

(i) Identify and protect important and economic mineral resources to enable mineral exploration and mining in accordance with acceptable environmental standards.
(ii) Identify and protect important basic raw material resources and provide for their extraction and use in accordance with *Statement of Planning Policy No. 10: Basic Raw Materials*.
(iii) Support sequencing of uses where appropriate to maximise options and resultant benefits to community and the environment.
(iv) Have regard to the *State Gravel Supply Strategy* (1998), the draft *Towards a State Lime Strategy* (2001) and any other Government adopted basic raw material or mineral strategy, in considering proposals for the extraction of basic raw materials and mineral resources.
(v) Support, where possible, improved efficiencies in the production and consumption of mineral and basic raw material resources to ensure their availability for future environmental and human uses.

5.8 Marine Resources and Aquaculture

Commercial and recreational fishing and aquaculture are important contributors to the State's economy, and adequate protection of marine, estuarine and riverine environments and resources that support these industries is required.
Whilst commercial fishing activities in Western Australia are focused in the marine environment, recreational fishing also occurs in creeks and estuaries and along the shore and contributes greater than

$570 million annually to the State's economy. Aquaculture continues to increase its importance, as new land based and marine aquaculture sites are established throughout the State.
Planning should recognise and account for areas of significance and ensure compatibility of land use planning decisions and actions associated with, and adjacent to, these areas.
Western Australia's planning system does not directly engage in planning for the marine environment. However, the need for integrated marine planning is acknowledged, and will be assisted by the preparation of a State marine planning strategy. Further, *Oceans Policy* (1999) outlines the Commonwealth government's intention to prepare regional marine plans. This includes Commonwealth waters adjacent to Western Australia.
Planning strategies, schemes and decision-making should:

(i) Take account of the location of areas of significance for recreational and commercial fishing and aquaculture, having regard to State, regional and local issues and characteristics. This should include land based infrastructure that supports these industries.

(ii) Seek to avoid or minimise any adverse impacts, directly or indirectly, on areas of significance for commercial and recreational fishing and aquaculture as a result of adjacent land use planning decisions and actions.

5.9 Landscape

Western Australia has a diversity of high value landscapes and scenic areas, many of which are unique to Australia. These range from the unmodified semi-arid and subtropical landscapes of the north and east of the State to modified rural farming landscapes in the south-west, and encompass a diversity of natural coastal landscapes, vast flat plains, mountain ridges and forested areas.
There is an increasing appreciation and valuing of natural landscapes by the community. These landscapes provide opportunities for recreation and tourism and fulfil a psychological need in providing a contrast to the urban environments in which the majority of Australians live.
It is recognised that landscapes change in response to demands for primary products, recreation and tourism as well as for rural living. Furthermore, the values of the community with regard to landscapes also change over time. Accordingly, as the State grows, it will be increasingly important to ensure that those landscapes that are valued by the community are protected. To do this it is necessary to identify the landscape types and features requiring special attention, and to develop appropriate management and planning policies that can positively contribute to their maintenance and enhancement.
Planning strategies, schemes and decision-making should:

(i) Identify and safeguard landscapes with high geological, geomorphological or ecological values, as well as those of aesthetic, cultural or historical value to the community, and encourage the restoration of those that are degraded.

(ii) In areas identified in 5.9(i) above, consider the level or capacity of the landscape to absorb new activities and incorporate appropriate planning and building design and siting criteria to ensure that new development is consistent and sensitive to the character and quality of the landscape.

(iii) Consider the need for a landscape, cultural or visual impact assessment for land use or development proposals that may have a significant impact on sensitive landscapes.

5.10 Greenhouse Gas Emissions and Energy Efficiency

There is widespread awareness of the need to increase the efficiency with which energy is used in Western Australia, including the need to reduce our reliance on energy produced from non-renewable resources such as fossil fuels. The primary objective is to reduce greenhouse gas emissions by means including (but not limited to) increasing energy efficiency, decreasing reliance on non-renewable fuels, and increasing usage of renewable energy sources.
The most recent National State of the Environment report recognises that Australians have a high per capita level of greenhouse emissions by world standards, increasing by 16.9% between 1990 and 1998.
Guided by the *National Greenhouse Strategy* (1998), the *draft State Sustainability Strategy* (2002), and the State greenhouse strategy currently being developed, planning can contribute to reducing the use of energy by the community through the design of urban settlements, promoting the use of alternative fuels and encouraging landscaping to provide energy efficient microclimates. Planning can also contribute to reductions in greenhouse gas emissions by reducing car dependency and encouraging the retention of vegetation and promoting revegetation in land use and development proposals.
Planning strategies, schemes and decision making should:

(i) Promote energy efficient development and urban design incorporating such issues as energy efficient building design, walkable neighbourhoods, higher densities in areas accessible to high quality public transport, local access to employment, retail and community facilities, and orientation of building lots for solar efficiency.

(ii) Support the retention of existing vegetation and revegetation in subdivision and development proposals.
(iii) Support the use of alternative energy generation, including renewable energy, where appropriate.
(iv) Support the adoption of adaptation measures that may be required to respond to climate change.

6. IMPLEMENTATION

The purpose of this policy is to inform local governments and the Town Planning Appeals Tribunal of those aspects of State-level planning policy concerning the environment and natural resources which should be taken into account in planning decision-making, while acknowledging the inherent difficulties of balancing conflicting needs. The policy will also guide the WAPC in undertaking its planning responsibilities and, where appropriate, in integrating and co-ordinating the activities of the many State agencies that influence the use and development of land as well as the management and protection of natural resources.

Measures for implementing the policy are many and varied. Primarily, implementation will be through the preparation of strategic plans, regional and local statutory schemes, conservation and management strategies, and other relevant plans to achieve the objectives of the policy. Implementation will also occur through the day to day process of decision-making on subdivision and development applications, and the actions of other State agencies in carrying out their responsibilities. Local governments and State agencies will need to take account of these policy measures to ensure integrated decision-making and in the planning and management of the environment and natural resources.

The State Government will support local governments where appropriate in the preparation of policies and plans, and to address the issues raised within this Policy. This may include the provision of data and relevant information to assist local governments in the preparation of their town planning schemes and plans, and in making other planning decisions.

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ACTIVE
IN FORCE

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Planning, Lands and Heritage**

Western Australian Planning Commission

State Planning Policy 2.4

Planning for Basic Raw Materials

July 2021

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Locked Bag 2506
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website: www.dplh.wa.gov.au
email: info@dplh.wa.gov.au

tel: 08 6551 8002
fax: 08 6551 9001
National Relay Service: 13 36 77

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1 CITATION

This is a State Planning Policy made under Part 3 of the *Planning and Development Act 2005*. The policy may be cited as *State Planning Policy 2.4 Planning for Basic Raw Materials* (SPP 2.4).

2 POLICY INTENT

To ensure basic raw materials (BRM) and extractive industries matters are considered during planning and development decision-making, to facilitate the responsible extraction and use of the State's BRM resources.

3 BASIC RAW MATERIALS IN WESTERN AUSTRALIA

BRM are a finite resource and their efficient use is required to ensure an ongoing supply to support economic development in Western Australia.

Essential for the construction of buildings, roads, other infrastructure and agricultural production, for the purposes of this policy BRM are:

- sand (including silica sand)
- clay
- hard rock (including dimension stone)
- limestone (including metallurgical limestone)
- agricultural lime
- gravel
- gypsum
- other construction and road building materials
- materials which may substitute BRM.

The extraction of BRM on freehold land is recognised as an extractive industry under the *Planning and Development (Local Planning Schemes) Regulations 2015*. Extractive industry proposals on freehold land require development approval from the relevant local government.

Extractive industry proposals on Crown Land are regulated under the *Mining Act 1978* and require a granted mining tenement.

3.1 Supply categories for Basic Raw Materials

This policy recognises the following site categories for BRM:

- Significant Geological Supplies (SGS) - are identified as the highest priority extraction areas for BRM. SGS are BRM identified by the Department of Mines, Industry Regulation and Safety (DMIRS) that represent strategic, long-term supplies of BRM requiring protection.
- Extraction Sites (ES) - comprise all commercial sites from which BRM are extracted, and quarries. These may overlap with SGS areas. ES may include future, proposed, approved and operating commercial extractive industries under the *Planning and Development (Local Planning Schemes) Regulations 2015*, the *Local Government Act 1995*, the *Mining Act 1978* or a combination of these Acts.

The identification of BRM under these categories does not obligate the landowner to extract these resources, nor that government approvals for extraction is guaranteed.

4 APPLICATION OF THIS POLICY

SPP 2.4 should be read in conjunction with the Planning for BRM guidelines (the BRM guidelines). This policy and BRM guidelines apply to the preparation and assessment of planning instruments, including region and local planning schemes; planning strategies, structure plans; subdivision and development proposals in Western Australia where:

(a) proposals are over, or adjacent to, sites identified to contain BRM resources

(b) significant volumes of fill may be required

(c) approval is required for extractive industries under the *Planning and Development Act 2005*

(d) extractive industry proposals are assessed under the *Mining Act 1987* and due regard is given to planning instruments by the decision-maker.

This policy is to be considered in conjunction with the interactive geological map GeoVIEW.WA, as well as other relevant legislation and policies as outlined in the associated BRM guidelines.

State Planning Policy 2.5 Rural Planning (SPP 2.5) addresses BRM matters on rural land. Until such time as SPP 2.5 is reviewed, where there is a conflict between SPP 2.5 and this policy in relation to BRM matters, this policy prevails to the extent of any inconsistency.

4.1 Basic raw materials resources mapping

This policy operates in association with the interactive geological map (GeoVIEW.WA) produced by DMIRS. The GeoVIEW.WA identifies:

- Significant Geological Supply (SGS) areas
- known, proposed, approved or operating extraction sites (ES)
- exclusion areas – known or proposed sites excluded from BRM extraction due to environmental values, resource conflicts or for land use planning reasons.

GeoVIEW.WA mapping provides more detail on the boundaries of SGS, ES and exclusion areas for the Perth and Peel regions than for other regions. Outside the Perth and Peel regions, SGS areas and known ES are identified by the presence of geological resources and mining tenements.

The BRM resource mapping will be updated over time. It is not possible to include all ES, due to constraints in accessing information, as well as the fact that some ES are only in operation for short periods of time, and their operation may commence and cease in between mapping updates.

4.2 Policy exemptions

This policy does not apply to:

(a) mining matters in accordance with the *Mining Act 1978*

(b) areas subject to State Agreement Acts

(c) the dredging of material from the bed of tidal waters under the *Mining Act 1978*

(d) extraction of BRM for public works as deemed necessary by local governments under the *Local Government Act 1995*.

5 POLICY OBJECTIVES

The objectives of this policy are to:

(a) ensure BRM and its regional importance is considered at the earliest stages of the planning process;

(b) protect BRM in SGS areas and ES by avoiding encroachment from incompatible land uses;

(c) ensure BRM resources are used efficiently in land use planning and development;

(d) identify BRM extraction opportunities through sequential land use without compromising the final intended land use; and

(e) ensure the extraction of BRM avoids, minimises or mitigates any adverse impacts on the community, water resources and biodiversity values.

6 POLICY MEASURES

Planning decisions that impact on, or are impacted by, BRM operations should comply with the following measures.

6.1 Higher order strategic planning instruments

Higher order strategic planning documents such as region schemes, regional and sub-regional frameworks, their amendments, plus sub-regional and district structure plans should, where appropriate:

(a) identify SGS areas as the primary sources for BRM and define known exclusion areas;

(b) avoid and/or minimise the potential negative impacts on amenity and the environment arising from an extractive industry, when identifying areas for future growth;

(c) avoid and/or minimise encroachment on identified BRM resources and extractive industry operations when identifying areas for future growth;

(d) identify opportunities for the extraction of BRM from SGS areas followed by sequential urban or industrial development, where appropriate. There is a presumption against region scheme amendments until it is demonstrated how sequential land use will be achieved where a BRM resource has been identified; and

(e) seek to locate new urban and industrial areas on land where the need for additional imported fill is minimised.

6.2 Local planning instruments

Local planning strategies, schemes and local structure plans (including any amendments to these documents) should, where appropriate:

(a) identify SGS areas, their separation distances and establish transitional land uses and interface areas to:

  i. protect known BRM SGS areas and ES from encroachment by incompatible land uses;

  ii. avoid any health risks or amenity implications for adjacent land uses;

(b) not compromise the extraction of resources on SGS areas and ES;

(c) require an approved structure plan where future urban or industrial land is proposed for BRM extraction areas and sequential land use that demonstrates land staging and site remediation including identification of finished ground levels;

(d) seek to locate new urban and industrial areas on land where the need for additional imported fill is minimised; and

(e) require proposals for subdivision to minimise imported BRM for new urban and industrial areas.

6.3 Subdivision and development

Subdivision and development applications should demonstrate:

(a) that land uses are compatible by avoiding sensitive land uses within SGS areas and/or extraction site separation distances as outlined in the EPA *Guidance Statement No 3 – Separation Distances between Industrial and Sensitive Land Uses*;

(b) that transitional and interface land uses are compatible and should;

  i. have due regard for existing and future settlement patterns as described in local planning instruments;

  ii. have due regard for the existing BRM operations and consultation with land owners;

  iii. have regard for relevant documents as outlined in the associated BRM guidelines;

  iv. require a 'notification on title' advising of the proximity and location of existing or potential future extractive industry activity and potential adverse impacts resulting from the activity;

(c) how subdivision and development of land will minimise imported fill through consideration of site-responsive design, bulk earthworks, drainage planning and alternative construction methods; and

(d) the application of vertical separation distances to groundwater and other management measures to protect water resources where an extractive industry is proposed.

6.4 Development within Significant Geological Supply or Extraction Sites

Applications for development approval for activities not related to BRM extraction in SGS or ES areas should be assessed to determine whether:

(a) a proposal will impact on current or future BRM extraction operations;

(b) a subject site is identified in regional or sub-regional frameworks, sub-regional or local planning strategies for another purpose; and

(c) development results in an increase in the number of people living, working or congregating within a defined separation distance.

6.5 Development approval and management plans

Unless exempt, applications to establish, extend or expand an extractive industry require development approval under an applicable local planning scheme. Applications for development approval should be supported by a management plan that demonstrates:

(a) site description and analysis;

(b) strategic and statutory planning requirements;

(c) identification of the environmental values and those requiring protection;

(d) that extractive industry operations are adhering to designated separation distances and will not impact or be impacted by sensitive land uses;

(e) proposed transport routes used and site access details;

(f) sequential land use and a staging plan for the rehabilitation of the site for its intended long-term use; and

(g) compliance with any other considerations as outlined in the BRM guidelines.

DEFINITIONS

The terms used in this policy complement those contained in the *Planning and Development (Local Planning Schemes) Regulations* 2015 Model Scheme Text. The following additional definitions apply within this policy:

Basic raw materials (BRM)

For this policy, BRM means:

- sand (including silica sand[1])
- clay[2]
- hard rock (including dimension stone)
- limestone (including metallurgical limestone)
- agricultural lime
- gravel
- gypsum
- other construction and road building materials
- materials which may substitute BRM.

Crown land

Crown land means all land except:

(a) land that has been reserved for or dedicated to any public purpose other than —

(i) land reserved for mining or commons;

(ii) land reserved and designated for public utility for any purpose under the *Land Administration Act 1997*;

(b) land that has been lawfully granted or contracted to be granted in fee simple by or on behalf of the Crown;

(c) land that is subject to any lease granted by or on behalf of the Crown other than —

(i) a pastoral lease within the meaning of the *Land Administration Act 1997*, or a lease otherwise granted for grazing purposes only; or

(ii) a lease for timber purposes; or

(iii) a lease of Crown land for the use and benefit of the Aboriginal inhabitants;

(d) land that is a townsite within the meaning of the *Land Administration Act 1997*.

Exclusion areas

Exclusion areas contain known BRM resources but are considered unfavourable for excavation. These areas are likely to have protected environmental values or are excluded for planning or infrastructure reasons. There is a presumption against approval of extraction in these locations.

Extraction sites (ES)

ES comprise all commercial extraction areas for BRM and BRM quarries used by government for infrastructure. ES include operating, approved and proposed commercial (extractive) industries under the *Planning and Development Act 2005*, the *Local Government Act 1995*, the *Mining Act 1978* or a combination of these legislations. They may occur wholly or partly within or outside of SGS areas. Where they occur outside of SGS areas, they provide important local supplies and in some cases, provide for a specific market niche over the short to medium term.

Industry – extractive

Means premises, other than premises used for mining operations, that are used for the extraction of BRM including by means of ripping, blasting or dredging and may include facilities for any of the following purposes:

(a) the processing of raw materials including crushing, screening, washing, blending or grading;

(b) activities associated with the extraction of BRM including wastewater treatment, storage, rehabilitation, loading, transportation, maintenance and administration.

Interface

A point where different types of land uses meet or are in close proximity.

Note: Planning needs to manage this interface in situations where conflict may arise from the activities from one land use that affects others. Therefore, land uses at the point of interface need to be compatible.

Rehabilitation

Refers to activities related to site restoration during or following BRM extraction activities. Rehabilitation will consider short-term requirements, the intended final

[1] The *Mining Act 1978* covers silica, mineral and garnet sand on most land holdings – except certain pre-1899 land titles that hold Mineral to Owner rights.

[2] The *Mining Act 1978* covers kaolin, bentonite, attapulgite and montmorillonite clays on all land holdings

(sequential) land use of the site and conditions placed on operations. This should consider landform and finished floor levels, groundwater protection, management of air and water erosion, and future infrastructure requirements.

Separation distances

A separation distance is the distance recommended by the Environmental Protection Authority (EPA) to separate a source of emissions from sensitive land uses. Separation distances are determined in accordance with the EPA *Guidance Statement No.3 - Separation Distances between Industrial and Sensitive Land Uses* and should guide the establishment of transitional land uses that ensure the protection of community health, safety and amenity.

The separation distance has been established as the shortest distance between the boundary of an impacting land use (such as industrial) and the boundary of a sensitive land use (residential, for example).

Separation distances provide protection to sensitive land uses from an impacting land use but also protect the impacting land use from encroachment of incompatible land uses.

Sensitive land use

Sensitive land uses comprise land uses that are residential or institutional in nature, where people live or regularly spend extended periods of time. These include dwellings, short-stay accommodation, schools, hospitals and childcare centres and generally exclude commercial or industrial premises.

Significant Geological Supplies (SGS)

SGS are BRM areas identified by the Department of Mines, Industry, Regulation and Safety (DMIRS) as having State significance due to the size of the resource, relative scarcity, demand and/or location near growth areas and transport routes.

Special Control Areas

Special control areas (SCA) are intended to control a type of development which does not generally occur within a zone or reserve. The control may apply to only part of a zone or reserve or may overlap zone and reserve boundaries.

Transitional land uses

Within the separation distance a series of transitioning land uses may be used to transition between the impacting land use (for example, emitting noise, vibration, dust, odour etc) and sensitive land use being separated. Transitional land uses should be compatible and/or synergistic with adjacent land uses. There may be multiple interfaces within the separation distance depending on the number of transitional land uses.

Transport impact assessment

A transport impact assessment (TIA) determines the types and level of transport-related impacts on the community and amenity that may be generated from development and necessary mitigation actions. TIA guidelines support transport planning information, the level of information required and the format in which it should be presented for consideration.

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Planning, Lands and Heritage**

Western Australian Planning Commission

ACTIVE
IN FORCE

State Planning Policy 2.4 Planning for Basic Raw Materials Guidelines

July 2021

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The Department of Planning, Lands and Heritage acknowledges the traditional owners and custodians of this land. We pay our respect to Elders past and present, their descendants who are with us today, and those who will follow in their footsteps. DPLH gratefully acknowledges the support and assistance of consultants Urbaqua Land and Urban Water Solutions in the development of this document.

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1 INTRODUCTION

These guidelines should be read in conjunction with *State Planning Policy 2.4 Planning for Basic Raw Materials* (SPP 2.4).

1.1 Purpose

These guidelines provide support for decision-making authorities, proponents and referral agencies to implement SPP 2.4. Specifically, they assist in:

1. guiding the appropriate land use planning practices and development approval requirements in relation to Basic Raw Materials (BRM) across Western Australia by specifying requirements to be met during planning and development processes; and
2. ensuring that necessary BRM management measures are incorporated into land development.

These guidelines outline a range of considerations relevant to the establishment, expansion or modification of BRM operations in Western Australia and are structured into two sections:

PART 1. Guidance for planning decision-makers when determining BRM proposals.

PART 2. Information for proponents to gain a general understanding of the requirements associated with BRM proposals.

The information provided in these guidelines may be used to inform extractive industry proposals, subject to other approvals processes.

2 BASIC RAW MATERIALS IN WESTERN AUSTRALIA

2.1 What are basic raw materials?

SPP 2.4 defines BRM as:

- sand (including silica sand[1])
- clay[2]
- hard rock (including dimension stone)
- limestone (including metallurgical limestone)
- agricultural lime
- gravel
- gypsum
- other construction and road building materials
- materials which may substitute BRM.

2.2 Extractive industries and basic raw materials categories

Planning and Development (Local Planning Schemes) Regulations 2015 – Schedule 1 Model provisions defines extractive industries as:

industry - extractive; means premises, other than premises used for mining operations, that are used for the extraction of basic raw materials including by means of ripping, blasting or dredging and may include facilities for any of the following purposes –

(a) the processing of raw materials including crushing, screening, washing, blending or grading;

(b) activities associated with the extraction of basic raw materials including wastewater treatment, storage, rehabilitation, loading, transportation, maintenance and administration.

Premises, associated with an approved BRM extraction, on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated may require additional approvals under environmental legislation.

BRM supplies have been grouped into Significant Geological Supply (SGS) areas and Extraction Sites (ES), defined below:

(a) SGS areas - are identified as the highest-priority extraction areas for BRM. They represent strategic, long-term supplies of BRM materials requiring protection.

(b) ES - comprise all commercial BRM ES and quarries. These may overlap SGS areas. ES may include future, proposed, approved and operating commercial (extractive) industries under the *Planning and Development (Local Planning Schemes) Regulations 2015*, the *Local Government Act 1995*, the *Mining Act 1978* or a combination of these.

2.3 Map of Significant Geological Supplies

In order to assist with planning for BRM extraction, the identification of BRM resources has been undertaken by the State Government for the regions of Western Australia where BRM is in high demand. SGS areas have been

[1] The *Mining Act 1978* covers silica, mineral and garnet sand on most land holdings – except certain pre-1899 land titles that hold Mineral to Owner rights.

[2] The *Mining Act 1978* covers kaolin, bentonite, attapulgite and montmorillonite clays on all land holdings

mapped based on the quality and quantity of BRM and are the highest priority for BRM extraction. Boundaries of SGS are often indicative.

Further mapping will occur as more information on BRM resource locations and demand become available.

Strategic BRM resource mapping in Perth and Peel has been developed to enable adequate supply of BRM for a population of 3.5 million, and is publicly viewable as spatial layers through *GeoVIEW.WA*. The mapping considers the quality and quantity of resources available and presents SGS areas, ES and BRM exclusion areas. Exclusion areas are locations that may contain BRM but have been excluded to protect existing environmental values, or for planning or infrastructure reasons.

Decision-makers should have due regard for BRM mapping. BRM *GeoVIEW.WA* mapping for Western Australia is on the Department of Mines, Industry Regulation and Safety (DMIRS) website. This data layer can also be viewed on the Department of Planning, Lands and Heritage PlanWA public mapping tool.

2.4 Development approvals for basic raw materials

The current legislative arrangements have varying requirements for different types of land tenure in respect of extractive industry operations. The approval process for the three most common types of land tenure are summarised in the table below.

SPP 2.4 and these guidelines apply to BRM proposals on freehold land determined under the *Planning and Development Act 2005*. They may also be used to help inform the assessment of proposals on Crown land by DMIRS, and the determination of extractive industry license applications by local government. Planning or license applications for extractive industries may require an accompanying management plan which provides details of the proposed use, development and management of the site.

Type	Process	Decision-making authority
Freehold land	BRM proposals on private land (freehold) generally require development approval under a local planning scheme for both the excavation of BRM and related buildings such as offices, fuel storage, hardstand areas and ablution facilities. Where BRM occur on private land, extraction may also be administered through an extractive industry licence. Local governments issue an extractive industry licence, through a local law, as provided under the *Local Government Act 1995*. Most local governments have created local laws specific to extractive industries. Local governments often require development approval together with an extractive industry licence before extraction can take place. Extractive industry licences are processed independent of the development approval determination, however the two can be assessed simultaneously. An application for an extractive industry licence should be applied for at the same time as the development application.	Local government and/ or WAPC
Crown land	Where BRM occur on Crown land (unallocated, reserve or pastoral leases) extraction for commercial sale requires a mining lease. Mining tenements are issued under the *Mining Act 1978*.	DMIRS
Reserved land	Where BRM occur on reserved Crown land for national parks; water and nature reserves; conservation parks; state forests; commons, and the like, they require a mining lease. Mining tenements are issued under the *Mining Act 1978*.	DMIRS

2.5 Submission procedures

Extractive industry applications on freehold land will be submitted directly to the relevant local government for assessment based on relevant local planning scheme provisions, policies or strategies (where applicable).

Region schemes in WA have different approaches to extractive industries. In areas with region schemes, on freehold land, the Western Australian Planning Commission (WAPC) may be consulted on proposals of regional significance.

Extractive industry proposals on Crown land are submitted to DMIRS for assessment. DMIRS may also seek planning advice from the WAPC around extractive industries on Crown land.

PART 1 – GUIDANCE FOR PLANNING AUTHORITIES

3 BASIC RAW MATERIALS GUIDANCE FOR PLANNING PROPOSALS

BRM is a finite resource and its extraction and use need to be undertaken in an efficient manner. The following guidance outlines considerations to be addressed when preparing and determining proposals at all levels of the planning framework for extractive industries or where planning proposals may impact on, or be impacted by, existing extractive industry operations.

Implementation of SPP 2.4 will occur through planning and decision-making by:

(a) ensuring extractive industries can be undertaken within confirmed SGS areas and approved ES while recognising associated separation distances and transitional land uses;

(b) consideration of land for future development as 'sequential land use' until the BRM has been extracted or development is anticipated on the site;

(c) having due regard to SPP 2.4 and provisions related to BRM when assessing extractive industry proposals, and other development applications within, adjacent to or in proximity to SGS areas and ES; and

(d) having due regard to the EPA's *Guidance Statement No. 3: Separation Distances between Industrial and Sensitive Land Uses (2005)* and ensure recommended separation distances are provided for.

In the preparation of planning instruments, the location of BRM should be considered, as identified, by *GeoVIEW.WA* mapping.

3.1 Higher order strategic planning instruments

Higher order strategic planning documents include region schemes and their amendments, regional and subregional frameworks, sub-regional and district structure plans.

Higher order strategic planning instruments should identify SGS areas and minimise the potential for amenity and environmental impacts arising from an extractive industry. They should also identify areas for future growth which avoid and/or minimise encroachment on identified BRM resources and extractive industry operations.

In identifying areas for extraction of BRM, higher order planning instruments should plan for sequential urban or industrial development where appropriate. This may include a scenario where an exhausted BRM site is then used for industrial development. There may also be opportunities for the extraction of BRM prior to the development of land.

Strategic BRM planning has been undertaken in the Perth and Peel regions to provide industry, proponents and decision-makers information on the location of BRM resources and where extractive industries are best located and excluded. This has resulted in detailed BRM resource mapping in Perth and Peel.

In the Greater Bunbury region, the Greater Bunbury Region Scheme identifies areas of known minerals and basic raw materials, as well as areas constrained for extraction and others designated as strategic resource areas.

Higher order planning proposals should seek to locate new urban and industrial areas on land where the need for additional imported fill is minimised. In addition to the strategic location and overall suitability for development, land use planning should consider the quantity of imported fill in low-lying areas prior to zoning for development.

Advice from the relevant government agencies on geological supplies, environmental values and planning matters should be sought from the appropriate agencies.

3.2 Local planning instruments

Local planning instruments include local planning strategies, schemes and local structure plans and their amendments.

These documents should identify SGS areas, required separation distances, as well as establish transitional land uses to manage interfaces within the required separation distances (where appropriate). This will assist in the protection of known BRM SGS areas and ES from encroachment by incompatible land uses.

A separation distance may be applied as a special control area – BRM or Restricted Use, through local scheme provisions, where existing, approved or expanded SGS areas and ES are to operate for the long term (for example, more than five years) and may have amenity impacts for sensitive land uses or as otherwise determined by the

decision-maker. When a special control area is utilised for separation distances, they should accommodate the movement of excavation operations.

Scheme provisions should identify incompatible land uses within the separation distance based on potential impacts to adjacent land. The following land uses should not be considered within the separation distance:

(a) sensitive land uses;

(b) land uses with off-site impacts or other requirements that may constrain the operations of the existing BRM operations;

(c) future planned development/expansion of the BRM operations within a SGS area;

(d) other land uses considered incompatible with BRM extraction.

Local planning schemes may establish compatible land use zones and/or reserves within the separation distance. However, this should not affect a non-conforming use that was previously allowed under zoning regulations.

To inform local planning, local governments are encouraged to map approved extraction sites and identified BRM resources to help avoid future land use conflicts. This will also ensure the protection of SGS areas and protect regional and locally significant areas of biodiversity and environmental value.

3.2.1 Local planning instruments and imported fill

Local planning schemes should require proposals for subdivision to minimise imported BRM for new urban and industrial areas. Scheme provisions may require plans for subdivision and development to demonstrate how imported fill will be minimised through alternative designs for drainage, earthwork and construction.

3.3 Subdivision and development

The preparation and assessment of subdivision and development proposals that may encroach upon or be impacted by existing extractive industries, should consider:

(a) that land uses within, or adjacent to, SGS areas and/or ES should avoid conflict between the proposed use and BRM extractive use through adherence to the recommended separation distances as outlined in the EPA's *Guidance Statement No 3. Separation Distances between Industrial and Sensitive Land Uses (2005)*;

(b) generally incompatible land uses should not be placed within the separation distance to ensure the protection of the existing extractive industry and the health and amenity of people in the proposed subdivision or development. An application within an extractive industry separation distance must demonstrate that it has considered transitional land use compatibility and the requirements of:

  i. future settlement patterns as required by the local planning framework and/or other relevant planning instruments;

  ii. any existing and planned future BRM operations in identified SGS areas or ES;

  iii. the decision-making authority's stakeholder consultation requirements;

  iv. relevant legislation, regulations and policies as outlined in these guidelines.

If proposed development or an activity deemed necessary is going to encroach upon an extractive industry site, the decision-maker may apply a notification on title advising of the proximity and location of existing or potential future extractive industry activity and potential adverse impacts resulting from the activity.

3.3.1 Subdivision and development minimising imported fill

Generally, subdivision proposals should consider how earthworks and drainage plans have demonstrated that they minimise imported fill requirements through appropriate design.

Subdivision proposals should demonstrate how they will minimise imported fill through a combination of the following approaches:

(a) site responsive design techniques;

(b) the engineering of bulk earthworks;

(c) drainage planning and technologies; and

(d) build form typologies and alternative construction methods.

An engineering and design professional may be needed to provide advice and develop supporting reports to address these matters.

The use of BRM substitute materials that demonstrated the required structural qualities are encouraged. Any substitute material proposed must have the relevant approval under environmental and health legislation. Potential substitutes may include secondary mining residue or construction and demolition materials diverted from landfill.

3.4 Separation distances

Separation between extractive industries and sensitive land uses in accordance with the EPA's *Separation Distances between Industrial and Sensitive Land Uses (GS3)* should guide the establishment of separation distances to protect community health, safety and amenity. These are available at www.epa.wa.gov.au

Separation distances are influenced by the activity being undertaken, site characteristics, the proposed location of infrastructure, access routes, pits and stockpiles, and the extraction method. Separation distances are not required where there are no current or planned sensitive land uses.

A separation distance is measured from the shortest distance between the extraction area boundary and the sensitive land use and does not always relate to cadastral boundaries.

The extent of a separation distance depends on the following elements:

(a) the type and scale of the proposal;

(b) Government requirements for a separation distance;

(c) existing or potential requirement for environmental licensing and/or works approval;

(d) industry-specific guidelines;

(e) technical studies;

(f) potential cumulative impacts;

(g) amenity, visual impact;

(h) environmental and topographic features;

(i) cadastre; and

(j) the continuation and/or expansion of the land use in the context of surrounding land uses.

Where excavation work in hard rock quarries requires blasting, the blasting area is an important consideration in defining separation distances and managing the risk to sensitive land uses.

Screening, washing, crushing, grinding, milling, sieving and aeration are activities associated with BRM extraction that may require a different separation distance.

3.5 Transitional land uses

Within an established separation distance, a series of transitional land uses may be used to transition between the extractive industry and a sensitive land use. Common transitional land uses include rural and commercial.

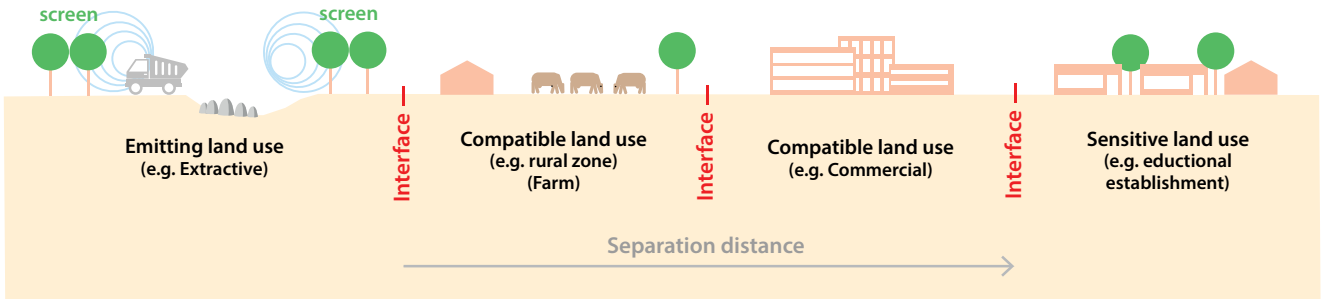
A separation distance is measured from the shortest distance between the extraction area boundary and the sensitive land use and does not always relate to cadastral boundaries. The nature of the extractive industry and the separation distance are an important consideration in determining the appropriateness of transitional land uses and permitted activities.

Transitional land uses should only be incorporated if they are compatible with both the extractive industry and sensitive land use that are being separated. For example, rural land uses may be appropriate within the separation distance as long as they are compatible with the extractive Industry being undertaken and the residential land use it is being separated from. The types of transitional land uses that are suitable would depend on the individual site conditions, management and mitigation treatments plus the nature of the extractive industry being undertaken.

Due to the temporal and mobile nature of some extractive industries (e.g. sand extraction) the types of transitional land uses may depend on identified future sequential land uses and land staging as determined by local schemes and strategies. Appropriate activities within the separation distance may also be temporary or semi-permanent in nature depending on the circumstances.

BRM extraction is generally undertaken on land zoned for rural purposes but can occur as a sequential land use on land zoned for other purposes.

Figure 1: Transitional land uses should occur within the separation distance and be managed at the interface to avoid conflicts between activities



4 ASSESSMENT OF PROPOSALS FOR EXTRACTIVE INDUSTRIES

Assessment of proposals to establish, extend or expand an extractive industry, as well as managing the potential impacts of the operation, should consider the following:

(a) the avoidance or mitigation of conflicts and detrimental effects on existing and future sensitive land uses and agricultural land in the surrounding areas (that is, noise, dust, vibration, blasting and vehicular traffic);

(b) having an effective consultation process with appropriate stakeholder engagement, including advertising as required;

(c) prioritisation of proposals within SGS areas aligned with DMIRS *GeoVIEW.WA* mapping in Perth and Peel;

(d) if the resource is identified as a SGS area and/or local basic raw material demand;

(e) the quantity and quality of resource and scale and duration of extraction;

(f) management of finished ground levels for BRM extraction and site rehabilitation to:

  i. maintain appropriate horizontal separation between extraction, water supply infrastructure and any other engineering requirements;

  ii. avoid the exposure of groundwater and maintain the required vertical separation distances to groundwater for sequential land use;

  iii. protect ground water and surface water quality.

(g) the site's potential for sequential land use and the ability to rehabilitate the land in a manner compatible with its long-term use as defined by the local planning scheme (see note below);

(h) the ability to stage the extraction operations to avoid conflicts with any adjacent sensitive land uses;

(i) the effect of the proposed extractive industry on any adjacent agricultural land;

(j) the availability and suitability of road access;

(k) the effect of the proposed extractive industry on any native flora and fauna and general landscape values;

(l) how all water resources will be protected during BRM extraction including a separation distance to the defined groundwater level plus other management measures to protect water resources during BRM extraction;

(m) potential impacts on fragmentation and connectivity of remnant vegetation;

(n) any requirements for an environmental offset;

(o) sites of cultural and historic significance on and near the land, having regard to how they are likely to be integrated with subsequent land uses; and

(p) location and stability of excavations, stock piles and overburden dumps.

Extractive industry operations may impact on nearby surface water and groundwater resources. See the Department of Water and Environmental Regulation (DWER) *Water Quality Protection Note 15 Basic Raw Materials Extraction* (2019) for information on the management of operations near sensitive water resources. BRM extraction proposals with potential environmental impacts should be referred to DWER for advice.

4.0.1 Extractive Industries and sequential land use

Extractive industry proposals involving the sequential use of land should be informed by the local planning scheme and zoning.

Structure plans should guide BRM extraction and the subsequent staging of urban or industrial development together with finished levels for the final land use. This will require structure planning to incorporate engineering advice. Structure plans and the staging of development may also inform planning approvals and extractive industry licence duration.

Clay pits may be re-engineered to support sequential land use in line with a local planning scheme including recontouring excavation areas as a water features which should be addressed in a rehabilitation plan.

4.1 Planning for completion

After excavation of BRM, land will need to be stabilised to supress sand and dust, which may include revegetation. All revegetation should be conditioned on the approval, and generally carried out in accordance with an approved revegetation plan.

On-site revegetation may be conducted when cleared land is no longer required for the purpose for which it was cleared. It is important for revegetation projects to be guided by a plan appropriate to the specific conditions and requirements of the site.

The revegetation plan should be prepared in consultation with an environmental specialist with appropriate expertise in revegetation techniques and experience specific to Western Australian conditions. See DWER's *A Guide to Preparing Revegetation Plans for Clearing Permits* (2018) for further guidance.

4.2 Pit design

BRM proposals may include plans for several pits staged over the lifespan of the operation. Smaller pits may achieve better environmental outcomes as the removed top soil is returned within a shorter timeframe. Pit rehabilitation generally follows excavation however decision-makers need to be aware of the proposed arrangements.

Further guidance on site rehabilitation is available in *Guidelines for the Management and Rehabilitation of Basic Raw Material Pits* (Dec 2008).

4.3 Operating hours

Operating hours should be included as a condition of approval. Operating hours are generally between 5am and 5pm, Monday to Saturday, however a local government may set its own conditions, for instance to support major infrastructure projects.

4.4 Conservation values

BRM extraction proposals with potential environmental impacts should be referred to the Department of Biodiversity, Conservation and Attractions (DBCA) for advice.

4.4.1 Wetland buffers and waterway foreshore areas

Where extractive industries are proposed near water resources, buffers may be required to protect the water resource from the impacts of its operations.
The determination of wetland buffers or waterway foreshore areas are addressed in the WAPC's *State Planning Policy 2.9 Water Resources*. In relation to buffers associated with extractive industries, the width of the buffer will be influenced by the values of the water resource, design and layout of an extractive industry operation, the risk of water contamination, and the technology and management measures used to protect the waterway or wetland.

Refer to the *Operational policy: Identifying and establishing waterway foreshore areas* (DWER 2012) for further advice on waterway foreshore areas.

4.4.2 Groundwater separation

Extractive industry operations may also impact on nearby surface water and groundwater resources. DWER's *Water Quality Protection Note 15 Basic Raw Materials Extraction* (2019) contains information on the management of operations near sensitive water resources.

To protect water quality, BRM extraction activity is generally required to achieve certain vertical separation distances to the groundwater table. The separation distance will vary based on the value or classification of the groundwater resource. For example, within public drinking water source areas, the groundwater separation distances are greater to protect drinking water quality and public health. Separation distances are outlined in DWER's *Water Quality Protection Note 15 Basic Raw Materials Extraction* (2019).

If an extractive industry proposal is located in a Public Drinking Water Supply Area, DWER's *Water Quality Protection Note 15 Basic Raw Materials Extraction* (2019) should be followed.

A licence to de-water or to gain access to water may be required under the *Rights in Water and Irrigation Act 1914*.

4.4.3 Native flora and fauna

BRM operations have the potential to disturb native vegetation and fauna, spread weeds and dieback. Pit design should seek to minimise and mitigate detrimental impacts on any native flora and fauna including the fragmentation of remnant vegetation.

Proposals which potentially impact on biodiversity may need the following additional approvals:

- clearing permit under Part V Division 2 of the *Environmental Protection Act 1986* from DWER (freehold land) or DMIRS (Crown land);
- authority to impact to threatened flora, fauna and ecological communities under the Biodiversity Conservation Act 2016 from DBCA; and/or
- referral of impacts to Matters of National Environmental Significance under the *Environment Protection and Biodiversity Conservation Act 1999* to Department of Agriculture, Water and the Environment (DAWE).

4.5 Water supply and availability

Water is needed for a range of activities that support the processing of BRM, such as dust suppression and for cleaning machinery and trucks. As well, it may be required for any on-site building as a site office. Access to scheme water may be required for extractive industry operations.

4.6 Transport management

To reduce the impact on roads, road users, community amenity and safety, extractive industry operators should manage their activities in line with Main Roads WA approvals and liaise closely with the relevant local government.

The availability and suitability of road access is an important consideration and may require a Transport Impact Assessment (TIA) and management plan. Both proponents and local government can seek a TIA and/or general advice from Main Roads WA regarding trucks and transport routes. These studies are usually undertaken by, or on behalf of, a proponent and consider the following:

(a) road suitability and the number of truck movements;

(b) frequency and size of truck movements;

(c) load considerations;

(d) route selection and any road upgrading requirements;

(e) impacts on sensitive land uses and other roads users;

(f) likely noise impacts;

(g) any extractive industry license or planning approval conditions limiting cartage activities;

(h) safety and sight distance in both directions from the proposal's access to a road; and

(i) safety and road crossing.

To assist with improving referral response times, proponents are encouraged to undertake pre-referral of a TIA to the relevant authorities, particularly where access and proposed haulage routes include major and/or regional roads. DPLH's *Transport Impact Assessment Guidelines* (2016) may assist both transport and land use planning professionals in undertaking transport impact assessments of land use development proposals.

A pre-assessed TIA can assist decision-makers in determining the need for future transport studies particularly where access and proposed haulage routes are frequent and include major and regional roads.

The Western Australian Local Government Association (WALGA) *Heavy Vehicle Cost Recovery Policy Guideline for Sealed Roads* (2017) assists decision-makers and proponents in understanding the principles of heavy vehicle cost recovery.

Through local law provisions, a local government may prescribe:

(a) the routes to be taken for the transport of BRM from a site through the roads within the district, if the proposed routes are not suitable for the proposed haulage;

(b) the tonnage limits to be transported along a particular route;

(c) the times during which materials from the site may be transported through the roads within the district.

See Appendix 1 for further guidance on Restricted Access Vehicle (RAV) route assessment guidelines.

4.7 Visual impacts

Preserving or replanting vegetation can assist in minimising visual impacts from roads, adjoining properties and other key viewing locations. Depending on the size and life of a quarry, a vegetative screen of at least 50 meters width is recommended to assist with visual impacts and help mitigate dust impacts.

The WAPC's *Visual Landscape Planning in WA* (2007) contains detailed guidance on addressing visual impacts, including ways to minimise the visibility of operations.

4.8 Noise, dust and risk management

Noise, dust and blasting are the main risks that require management to avoid adverse health and amenity impacts to sensitive land uses and the community in general.

Noise from BRM extraction is subject to the *Environmental Protection Act 1986* and the prescribed standards under the *Environmental Protection (Noise) Regulations 1997*.

Noise impacts to can be reduced through choice of quieter equipment, enclosing fixed plant, construction of barriers such as bunds, 'best practice' site management practices, and appropriate separation distances.

Dust can be generated in several ways including:

(a) blasting and extraction;

(b) stockpiling of material;

(c) processing of material;

(d) transport movements; and

(e) soil erosion.

Noise and dust require a management plan to ensure there are no off-site impacts, identify mechanisms to manage risks and supress dust generation. Guidance on managing dust can be accessed via the *DWER's A guideline for managing the impacts of dust and associated contaminants from land developments sites, contaminated sites remediation and other related activities* (2011).

Extractive industry proposals that are likely to generate dust and could affect human health may be subject to the provisions of the *Environmental Protection Act 1986* and subsidiary regulation and policies.

Proposals for hard rock or materials which require blasting should be accompanied by a blasting management plan detailing the blasting method, including directed blasts, frequency and the expected fly rock range and subsequent exclusion zones for blasting.

DMIRS manage the requirements for blasting in hard rock quarries.

PART 2 – GUIDANCE FOR PROPONENTS

5 GENERAL REQUIREMENTS

The following section outlines a range of additional considerations to be addressed when preparing a new extractive industry proposal or an extension of existing operations.

Proponents should also familiarise themselves with the content in Part 1 of this manual.

Proponents may require an extractive industry license and/or a development approval on freehold land, both issued by the relevant Local Government. Development approvals may be subject to different conditions prior to, during and after the operation of an extractive industry.

Extractive industry proposals or other development proposals that may affect extractive industries must demonstrate effective and appropriate community consultation. This includes consultation with neighbouring and affected properties plus relevant local governments leading up to the submission of a proposal. Proponents should also demonstrate ongoing stakeholder engagement via their Environmental Management System. Further advice can be found on the DMIRS website.

A list of other key responsibilities for proponents proposing an extractive industry on either freehold or Crown land is outlined below.

5.1 Legislation, regulation and policies

Proponents should consider the legislation, policy and guidelines relevant to an application and the issues needing to be addressed by proposals. This will help avoid potential delays (see Appendix 2).

5.2 Site selection considerations

SGS areas have been identified by DMIRS as the highest priority areas for BRM extraction. BRM extraction within SGS areas is therefore preferred, however extraction can also occur outside SGS areas, subject to approvals and licensing.

In the Perth and Peel regions, BRM exclusion areas have been identified – for either environmental, resource conflict or land use planning reasons – and must be avoided.

Section 7.0 checklist 1 highlights issues that a proponent should consider when selecting a site for extractive industries.

5.3 Consult relevant authorities issuing required approvals

Before submitting an application, proponents should consult with the relevant local government to help clarify what is expected from them in terms of approvals required, information to be submitted and stakeholder consultation. Having a draft proposal will enable feedback to be more specific to the proponent's application. Requirements for establishing an extractive industry application (for example, policies, development approval, extractive industry licences and the like) may vary between local governments.

Prior to submitting a proposal, proponents should demonstrate to relevant decision-maker – local government for freehold land, DMIRS for Crown land – that they have an effective stakeholder and community engagement plan that covers all phases of the project from planning through to operations, closure and rehabilitation.

It should be demonstrated that stakeholders have received sufficient information on the possible consequences or impacts of a proposal and a reasonable period must be provided for the consultation process. Proponents should engage with the relevant decision-maker (local government or DMIRS) for further advice on their requirements.

5.4 Environmental and natural resource considerations

DWER and DBCA are the primary contacts for environmental advice in relation to site selection, protection of environmental assets (wetlands, waterways, native vegetation, threatened ecological communities and DBCA-managed lands) plus the management of water quality impacts including groundwater vertical separation.

It is important to establish what approvals will be required in terms of clearing vegetation, impacts on threatened flora, fauna or ecological communities, industry license or works approval; licence to take water and water resource management issues, including groundwater separation requirements.

Proponents establishing a BRM operation in an area with existing vegetation may require a vegetation clearing permit under the *Environmental Protection Act 1986* issued by DMIRS (Crown land) or DWER (freehold land).

Any proposal involving BRM extraction from waterways requires careful risk assessment of the location's suitability, its management and rehabilitation.

Under the *Environmental Protection Act 1986* it is an offence to cause an emission or discharge from activities carried out on a prescribed premise (an industrial premise with potential to cause emissions and discharges to air, land or water) unless a works approval or licence is held for the premises. Prescribed premises are listed in Schedule 1 of the *Environmental Protection Regulations 1987* and may include activities undertaken by extractive industries.

DWER's Guideline Industry Regulation Guide to Licensing (2019) provides guidance on strategic and statutory land use planning processes, with reference to roles and responsibilities under Part IV and V of the *Environmental Protection Act 1986*.

5.5 Allocate sufficient time for assessment processes

Allow time to address issues that may arise after the application has been lodged. Assessments and studies require time to complete and sometimes can only be undertaken under certain conditions and at specific time of year (for example, flora surveys being undertaken in spring).

5.6 Appeal rights

Should a proponent disagree with a decision, they can seek a review by the State Administrative Tribunal (SAT) for all or part or of a decision made, under the *Planning and Development Act 2005*, or *Local Government Act 1995*.

Appeals for decisions made under the *Environmental Protection Act 1986* are determined by the Minister for Environment.

6 GUIDANCE ON PLANNING MATTERS

6.1 Western Australian planning system

The WAPC's *Introduction to the Western Australian Planning System* (2014) provides an overview of the planning system in Western Australia. This document clarifies the various roles, responsibilities and functions of the key players involved in the planning system. It also describes the various legislation relevant to land use planning in Western Australia and it outlines the key features of the statutory and strategic planning instruments that together make up the State's planning framework.

The decision-maker is required to give due regard to relevant planning policy when making decisions on BRM proposals, particularly the impacts on sensitive land uses.

6.2 Management plans and procedures

Planning applications for extractive industries may require an accompanying management plan which provides details of the proposed use, development and management of the site. Management plans need to be submitted before the application is determined. Issues of relevance may include, but are not restricted to:

(a) operational areas including:

  i. extraction and stock piles areas;

  ii. crushing/screening process areas; and

  iii. machinery maintenance areas, plant and fuel storage.

(b) separation distances;

(c) environmental management requirements;

(d) surface water and groundwater management;

(e) secure water supplies to meet domestic and operational demands;

(f) measures to mitigate impacts on surrounding land from dust, noise and flying rock;

(g) landscaping to screen activity on the site;

(h) on-site access roads, parking for cars and other vehicles used on the site; and

(i) rehabilitation, closure for future land use of a BRM extraction area.

For more information on the matters to be addressed by a management plan, refer to Appendix 3 - Management Plans.

It is helpful for proponents to submit all required applications simultaneously. This saves time and assists the relevant agencies assessing the proposal by ensuring a more coordinated approach. A covering letter referencing any other approvals being sought from other authorities should be attached to the planning proposal to avoid communication overlaps or misunderstanding among different approval authorities.

7 SITE SELECTION CHECKLIST

Proponents should consider the following two checklists when preparing an extractive industry proposal.

Checklist 1: 'Site selection considerations' includes issues that should be considered when selecting a site for extractive industries.

Checklist 2: 'Application submission checklist - local government' includes standard requirements for local government development applications, which also apply to applications referred to the WAPC for determination.

These checklists highlight the issues most local governments consider when assessing proposals for extractive industries and may help to ensure submissions are complete. However they do not replace documentation used in assessing an application. Local governments may also have specific requirements not included in these checklists, so proponents should contact the relevant local government to find out if there are any additional requirements. Local governments may wish to adapt Checklist 2 to address any specific variations within their municipality.

Checklist 1

Site selection considerations	
Environmental attributes	Tick
• The site is not listed for conservation purposes.	
• The site provides recommended setback to existing wetlands, water courses and drainage lines.	
• The proposal will not involve the clearing of native vegetation. That is, the site is bare of vegetation from previous uses and does not contain bushland of significant quantity or quality. (Declared Rare Flora and Fauna, Threatened Ecological Communities, for example.) Where a BRM resource is located with native flora and fauna and clearing is required a separate approval is required from DWER.	
• The proposal will not involve the disturbance of acid sulfate soils.	
• The site is not considered priority agricultural land.	
• The site is not in the flood plain and does not have a high groundwater table.	
Planning considerations	Tick
• The site has not been denoted as unacceptable or mapped as an exclusion Area for BRM extraction and the proposal aligns with defined Significant Geological Supply areas or Extraction Sites.	
• The nature of the proposed activity is consistent with the current and proposed zoning or represents a sequential land use opportunity for future development, considering future timeframes.	
• The timeframe of the proposed activity considers the long-term impacts on local communities and future land uses proposed within the vicinity or separation distances to sensitive land uses.	
• Appropriate separation distance to existing infrastructure such as public drinking water supply bores and water mains are maintained.	
• Bushfire planning where an extractive industry proposal is situated in a bushfire prone area.	
• The outcome of advertising undertaken, and submissions received.	
• Assessment considerations should also be made on the location and provision of ancillary facilities, such as lunch room, ablutions etc.	
Site location considerations	Tick
• The proposed activity is compatible with surrounding land uses.	
• The site does not contain any heritage significance, Aboriginal or otherwise.	
• The proposed activity will not cause disturbance to the amenity of the area.	
• The site has safe access to major roads, and existing roads are in good condition. The access roads proposed are suitable for the volume of traffic and type of heavy vehicles.	
• The site is not in a visually significant location, such as on a ridge, or visible from major roads and will not have a negative visual impact on major roads, scenic areas or adjoining properties.	
• The site provides an adequate separation distance to sensitive land uses such as (but not limited to) residential or special rural area, existing dwellings in a rural area, schools or hospitals. Depending on the nature of the BRM operation, separation distances should be anywhere between 300 and 1000 metres.	
• The site requires scheme water availability and/or may require a ground or surface water license under the *Rights in Water and Irrigation Act 1914*.	
• The site is located on karst risk areas and require specific geotechnical investigation.	
• Operational issues such as hours of operation, noise and dust monitoring and site access are addressed with the view to minimising any potential noise or dust issues for surrounding sites.	
• Other relevant State and local planning policies and strategies, including but not limited to the following have been addressed: – relevant State planning policies – extractive industry local laws – local planning scheme provisions – region scheme planning provisions.	

Checklist 2

Application submission checklist – local government	
Note: refer to the relevant local government's local law and local planning schemes for more specific application requirements. Proponents will need to provide the following information to expedite consideration of your application. If the information is not provided, approval is likely to be delayed while further enquiries are made	
Legal considerations	Tick
• Written consent from owners of site.	
• Relevant environmental approvals (for example, EP Act Part IV, Part V Division 2 Clearing permit, Part V works approval or license, water and irrigation licensing, EPBC Act decision).	
• Extractive industry license.	
• Local government submission form and fees.	
• WAPC submission form and fees (where applicable).	
• Certificate of title.	
• WAPC – have due regard for State planning policies.	
Site details	Tick
• Existing and proposed land contours.	
• Description of land – roads, boundaries, fences, existing buildings, water resources including groundwater levels, ridge lines, existing vegetation and the like.	
Proposed extractive industry details and staging plan	Tick
• Location, total area and depth of proposed excavation including appropriate vertical separation between the highest groundwater table, during and post BRM extraction.	
• Location and proposed maximum height of stockpiles.	
• How much material is proposed to be extracted (on an annual and total basis).	
• Method and route(s) of proposed vehicle access to and from the site.	
• Location of proposed buildings, treatment plants, tanks and the like.	
Details of management of operation	Tick
• Management of impacts on water quality, particularly if within a Public Drinking Water Supply Area. In the case of extraction over public drinking water sources, a plan should be provided as part of a development approval to enable orderly decision-making.	
• Noise and vibration attenuation – hours of operation, types of activities such as drilling or blasting, type of vehicles to be used, maximum number of truck movements per day, earth bund.	
• Screening – location of screening and species to be planted, staging of operations.	
• Dust management plan – dust suppression methods, location of stockpile areas relative to prevailing winds.	
• Environmental management – measures to protect existing vegetation, manage acid sulfate soil, control dieback, manage fire and flood risk, manage storm water run-off and water quality, drainage details, and treatment of wastes.	
• Staged site rehabilitation plan. Extraction site rehabilitation should not include waste disposal.	

8 EXTRACTIVE INDUSTRIES LOCAL LAW

Local government is empowered to make an extractive industry local law under the *Local Government Act 1995* which establishes license conditions. Elements of these guidelines may be relevant in relation to a proponent's submission and State and local government license requirements for:

(a) an excavation site plan;

(b) a works and excavation program;

(c) a rehabilitation and decommissioning program; and

(d) the transportation of BRM.

Limitations on excavation may be restricted to:

(a) 20 metres from the boundary of any land on which the excavation site is located;

(b) 20 metres from any land affected by a registered grant of easement;

(c) 50 metres from any road or thoroughfare;

(d) 50 metres of any bore, watercourse, wetland, swamp or other water reserve; or

(e) two metres to the DWER-determined maximum groundwater level and three meters in water resource protection areas or otherwise as adopted by the local government.

9 OTHER GOVERNMENT ADVICE

State and local government should assist the implementation of SPP 2.4 by:

(a) giving advice, support and information to the public in relation to development and land uses within, adjacent or in proximity to SGS areas, ES and associated separation distances and transitional land uses;

(b) ensuring streamlined exchange of information on the location of extractive industries approved by local government through the establishment of data sharing; and

(c) monitoring and assessing the application of SPP 2.4.

APPENDIX 1
RESTRICTED ACCESS VEHICLE (RAV) ROUTE ASSESSMENT

Summary - Extracted from *Main Roads WA Heavy Vehicle Services Standard Restricted Access Vehicle (RAV) Route Assessment guidelines* (2018).

Community considerations

Decision-makers need to consider potential community impacts as part of assessing route suitability.
The following factors are considered in determining potential community impacts:

Noise

In determining noise impacts in relation to RAVs, the following issues are considered:

(a) areas sensitive to road traffic noise, including residences, schools and hospitals;

(b) the likely number of RAVs in comparison to existing number of large trucks (three or more axles);

(c) factors contributing to noise generated by RAVs such as gradients, acceleration/deceleration areas, and road pavement irregularities; and

(d) factors mitigating RAV noise impact (distance, topography, bunds, cuttings or walls.

The main criterion for noise impact assessment is the change in the numbers of large trucks. Where noise impacts are expected to be significant, mitigating measures such as the following will be considered:

(a) approved noise reduction request signs;

(b) a curfew for RAVs during night time hours;

(c) consideration of alternative routes;

(d) noise certification of RAVs as a condition of access; and

(e) speed restrictions.

Where noise impacts are expected to remain significant despite mitigation actions, Main Roads WA will consult with the relevant local government and consider a route noise impact study.

Dust and dirt

Where the RAV route passes close to abutting development there may be adverse impacts upon people and property due to dust, especially where a route is unsealed. The decision-maker shall consider whether the introduction of the RAVs onto the route has potential to cause significant dust impact by considering:

(a) distance to buildings and their use;

(b) likely numbers of RAVs using the route;

(c) likelihood and amount of dust being produced by RAVs; and

(d) spreading dust impacts from RAVs entering onto a sealed road from a dirt road.

Where dust and dirt impacts are expected to be significant, the decision-maker will consider options such as alternative routes, speed restrictions and possibly sealing road sections. For short-term projects, when sealing the road is not practical, the proponent shall consider dust suppression (water or chemical stabilisation) and wheel washing at site exit.

Community consultation

In line with government policy, Main Roads WA may require a route that has been given a favourable assessment to undergo community consultation.
Main Roads WA and local government will determine the need for community consultation.

Alternative transport modes

Alternative transport modes need to be considered to ensure RAV road transport is the most effective form of transport available for the operation.

Further assistance

Additional information and guidance is available from Main Roads WA Heavy Vehicle Services.

APPENDIX 2
RELEVANT LEGISLATION, REGULATION AND POLICIES

Various regulations and guidelines complement and overlap with the planning system, and some BRM proposals may require approvals by other decision-makers. This attachment describes additional legislation and regulation for extractive industry proposals that may require consideration during planning decision-making. Requirements may change from time to time and the onus is on the proponent to ensure they have all the necessary approvals. The following information is provided to assist. Compliance with other legislation should not be interpreted as approval by the WAPC under the *Planning and Development Act 2005*.

State environmental legislation

(a) The EPA considers the environmental impacts of planning schemes and scheme amendments under Part IV, section 48A of the *Environmental Protection Act 1986*. Schemes and scheme amendments must be referred to the EPA prior to being advertised for public comment to determine if the scheme should be assessed or not, or is incapable of being made environmentally acceptable. Individual development proposals that are likely to have a significant effect on the environment are also required to be referred to the EPA under Part IV, section 38 of the *Environmental Protection Act 1986*.

(b) The EPA's *Guidance Statement No.3 Separation Distances Between Industrial and Sensitive Land Uses* (2005) provides advice on which land uses require separation, and recommends the appropriate separation distances. The guidance outlines the EPA's expectations on the application of separation distances for schemes and scheme amendments in the environmental impacts assessment process. The guidance also supports strategic and statutory land use planning and development decisions by planning authorities where proposed land uses have the potential to adversely impact on human health and amenity.

(c) In considering a clearing matter under Part V Division 2 of the *Environmental Protection Act 1986*, the CEO shall have regard to any planning instrument, or other matter, that the CEO considers relevant.

(d) Part V Division 3 of the *Environmental Protection Act 1986* makes it an offence to cause an emission or discharge from activities carried out on a prescribed premise unless a works approval or licence is held for the premises. Prescribed premises are listed in Schedule 1 of the *Environmental Protection Regulations 1987* and may include activities undertaken by extractive industries. See the DWER's *Guideline Industry Regulation Guide to Licensing* (2019) to assess applications under Part V Division 3 of the *Environmental Protection Act 1986* concurrently with applications for planning approval and to make a determination once relevant planning decisions have been made.

Licences and works approvals may be granted subject to conditions to prevent, control, abate or mitigate pollution or environmental harm. Licences may be granted for up to 20 years, depending on the risk to public health and the environment posed by the premises as well as the duration of other statutory approvals, including planning approvals. Any changes to operating prescribed premises that may alter emissions must seek a licence amendment.

(e) The *Biodiversity Conservation Act 2016* and *Biodiversity Conservation Regulations 2018* replace the *Wildlife Conservation Act 1950* and the *Sandalwood Act 1929* and their associated regulations. These enforce a licensing regime which requires licences for taking, disturbing, supplying, possessing, processing, dealing, importing and exporting activities in relation to specific flora and fauna and ecological communities and in specific circumstances may be applicable to extractive industry operations.

Commonwealth environmental approvals

(f) Under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* approval is needed from the Commonwealth Minister for any proposal or action that has, will have or is likely to have a significant impact on any of the matters of national environmental significance.

Water resources

(g) The DWER seeks to conserve, protect, manage and assess water resources and provide for the sustainable use and development of water resources under

the *Water Agencies (Powers) Act 1984*, *Rights in Water and Irrigation Act 1914* and *Waterways Conservation Act 1976*. Water resource availability is informed by allocation plans and limits under the Rights in Water and *Irrigation Act 1914*. Clearing within gazetted Controlled Catchment Areas under the *Country Areas Water Supply Act 1947 Part IIA* is regulated by the DWER for salinity management purposes.

(h) If abstraction or de-watering is required to enable the extraction to occur, this could result in significant environmental effects (such as impacts on native vegetation, wetlands or waterways), the DWER may need to refer the proposal to the EPA under s38 of the *Environmental Protection Act 1986*.

(i) Public drinking water source areas are defined by the DWER and proclaimed as water reserves, catchment areas or underground water pollution control areas under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909*, or water reserves or catchment areas under the *Country Areas Water Supply Act 1947*. Land use and development in public drinking water source areas is guided by the following documents:

  i. WAPC's *State Planning Policies 2.2 Gnangara groundwater protection (2005), 2.3 Jandakot groundwater protection (2017), 2.7 Public drinking water source policy (2003), 2.9 Water resources (2006)*.

  ii. DWER's *Water Quality Protection Note 15 Basic Raw Materials Extraction (2019), Water Quality Protection Note 25: Land use compatibility tables for public drinking water source areas (2016)*.

  iii. Sub-regional planning frameworks, region and local planning schemes.

State mining legislation

(j) Where a planning proposal may be negatively impacted by a BRM mining operation undertaken through the *Mining Act 1978*, the planning decision-maker should seek advice from DMIRS regarding the risk and acceptability of potential offsite impacts.

While the Minister for Mines and Petroleum, the Warden or the Mining Registrar will consider planning instruments when considering an application for a mining tenement, a planning instrument cannot operate to prohibit or affect the grant of such tenement.

(k) Industries involving explosives and other dangerous goods, including extractive industries with potential off-site risks are regulated by the DMIRS under the *Dangerous Good Safety Act 2004* and the *Mines Safety and Inspection Act 1994*. Information on the types of goods and the critical qualities which require licensing are listed in the DMIRS's Safety Guidance Minimum separation distances between explosive facilities and various categories of incompatible land uses are provided in Australian Standard *AS2187.1*(1998) and the *DMIRS's Dangerous Goods Safety Guidance Note – Storage of Explosives* (2018).

(l) The *Mining Act 1978* (the Mining Act) refers to "guidelines" as the mechanism for mandating the form and information required in mining proposals and mine closure plans. Statutory Guidelines are referred to in the definition of a mining proposal and mine closure plan in the legislation and the follow DMIRS documents are mandatory requirements: *Statutory Guideline for mining proposals in Western Australia* (2020) and *Statutory Guideline for mine closure plans in Western Australia* (2020).

APPENDIX 3
MANAGEMENT PLANS

An application for the establishment, extension or expansion of an extractive industry should be accompanied by a management plan and should typically address:

(a) site description and analysis;

(b) consideration of statutory and strategic planning;

(c) management and operations of the proposal;

(d) consideration and management of impacts on amenity;

(e) biosecurity measures to prevent the spread of weeds and diseases; and

(f) environmental impact assessment and management.

Critical elements of management plans may also be addressed as conditions of approval.

Other important elements that may need to be considered depending on the site location and circumstances include:

(g) demonstration that the existing sensitive land uses within the guidance separation distance of the extractive industry will not be unduly affected by the extractive industry operations;

(h) identification and justification of appropriate transitional land uses;

(i) identification of any environmental values requiring protection under Commonwealth and State legislation and appropriate strategies to protect the values;

(j) in the Perth and Peel regions, proposals aligned with the BRM resource mapping will help address (c) above;

(k) details of the proposed use, development and management of the site including the environmental and water resource management standards, extractive area, stock piles, machinery maintenance areas, processing plants, fuel storage and on-site access roads, parking for cars and other vehicles used on the site, and proposals for landscaping to screen activity on the site;

(l) details of arrangements for access to the site, including the roads which it proposes will provide the main vehicular access and likely traffic flows; and

(m) consideration of sequential land use by establishing a plan for the progressive and ultimate rehabilitation of the site for its intended long-term use. Site rehabilitation should not include waste disposal.

Department of Planning

Western Australian Planning Commission

State Planning Policy 2.5

Rural Planning

December 2016

Prepared under Part Three of the Planning and Development Act 2005 by the Western Australian Planning Commission

Replaces State Planning Policy 4.3 as published in the Government Gazette on 18 December 1998 and 19 September 2003

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Gordon Stephenson House
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website: www.planning.wa.gov.au
email: corporate@planning.wa.gov.au

tel: 08 6551 9000
fax: 08 6551 9001
National Relay Service: 13 36 77
infoline: 1800 626 477

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1 CITATION

This is a State Planning Policy made under Part 3 of the *Planning and Development Act 2005*. This policy may be cited as *State Planning Policy No. 2.5: Rural Planning (SPP 2.5)*.

This policy replaces *State Planning Policy No. 2.5: Land Use Planning in Rural Areas (2013)* and repeals *State Planning Policy 4.3: Poultry Farms Policy (1998)*.

This policy supersedes *State Planning Policy 2.4: Basic Raw Materials (2000)* for the shires of Gingin, Chittering, Northam and Toodyay.

2 POLICY INTENT

The purpose of this policy is to protect and preserve Western Australia's rural land assets due to the importance of their economic, natural resource, food production, environmental and landscape values. Ensuring broad compatibility between land uses is essential to delivering this outcome.

3 BACKGROUND

The changes in land use in Western Australia in the years since European settlement in 1829 have been dramatic. Clearing, subdivision, development, and use of land for settlement and agriculture provided significant economic and social benefits to the expanding Western Australian community.

Western Australia's population is expected to increase to more than five million people by 2061. Demand pressures associated with economic and population growth are occurring in an environment where the quality and availability of rural land has declined, due largely to settlement pressure, natural resource degradation and climate change.

A growing economy and population will increase the pressure on rural land to be used for a wide variety of purposes including urban settlement, economic development, infrastructure and utilities, essential services such as water supply, areas for conservation, cultural and recreational purposes, and food production.

Rural land accommodates significant environmental assets and natural landscape values, and areas with mineral, petroleum, geothermal energy and basic raw materials resources, which need to be factored into planning for rural areas.

As a result of the State's growth, rural land resources are becoming increasingly contested leading to increased competition and conflict. Sustainable planning requires decision-makers to be fully informed and requires economic, environmental and social issues to be taken into account. This policy aims to support rural land and land uses to cater for both anticipated and unexpected future needs.

3.1 Where this policy applies

This policy applies to rural land and rural land uses in Western Australia, in particular:

(a) land zoned for rural or agricultural purposes in a region or local planning scheme;

(b) land identified or proposed for rural living in an endorsed scheme or strategy;

(c) rural land uses on rural zoned land;

(d) rural land uses on land that is not zoned for rural purposes; and

(e) land that may be impacted by rural land uses.

There is a relationship between this policy and the Western Australian Planning Commission (WAPC)'s State Planning Policy 4.1, which applies to industrial land and land uses, in that both policies deal with separation distances and buffers.

Due to their size, scale and potential level of impact, some rural land uses could be considered industrial, some rural land uses are located on industrial land, and some industrial land uses are on rural land. Decision-makers will need to consider policy application in the context of the proposal.

3.2 Policy exemptions

This policy does not apply to:

(a) the extraction of basic raw materials within the Perth and Peel planning regions;

(b) areas subject to State Agreement acts;

(c) mining that is in accordance with the *Mining Act 1978*, with the exception of basic raw materials on Crown land;

(d) existing approvals in retrospect, including structure plans, subdivisions and development; and

(e) matters dealt with by the *Swan Valley Planning Act 1995* (or superseding legislation).

3.3 When this policy applies

This policy is to be applied to State and local government planning decision-making for:

(a) the preparation or assessment of region schemes, regional strategies or frameworks, sub-regional strategies, local planning strategies and schemes and structure plans or to any amendments to these;

(b) subdivision proposals for rural zoned land, in tandem with *Development Control Policy 3.4: Subdivision of rural land*; and

(c) development proposals on rural zoned land; and for rural land uses on land zoned for other purposes, in accordance with region and local scheme requirements, which can include diversification permits issued under Part 7 of the *Land Administration Act 1997* and other development on Crown land.

Where there is no WAPC endorsed strategic or statutory planning instrument in place to guide WAPC decision-making, the intent and measures of this policy shall apply. Where an endorsed strategy conflicts with the intent of State policy, this policy shall prevail, unless a regional variation has been approved by the WAPC.

3.4 Other relevant regulation and policies

Other regulations and policies overlap with the planning system, and some proposals may require approvals outside the planning system. This section outlines other factors and approvals that may be required for proposals on rural zoned land or for rural land uses:

(a) The *Environmental Protection Act 1986* defines a proposal as a project, plan, program, policy, operation, undertaking or development, or change in land use, or amendment of any of these, but does not include a scheme. Proposals that are likely to have significant environmental impacts are required to be referred to the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986*.

Under s81 of the *Planning and Development Act 2005*, schemes and amendments are referred to the EPA under s48A of *Environmental Protection Act 1986,* therefore environmental consideration and/or formal assessment precedes planning decision-making.

Where environmental impacts may be significant (such as impacts on native vegetation, wetlands or waterways), local governments are required to refer the proposal to the EPA under s38 of the *Environmental Protection Act 1986*. A proponent may also elect to refer a proposal to the EPA under s38.

(b) Environmental impacts for proposals that do not require assessment under Part IV of the *Environmental Protection Act 1986* may be subject to regulation under Part V of the *Environmental Protection Act 1986*, including the requirement for a works approval and licence. Prescribed premises are listed in Schedule 1 of the *Environmental Protection Regulations 1987*. Where proposals are not referred to the EPA under s48A or s38 of the *Environmental Protection Act 1986*, planning decision-making should precede environmental works approval and licensing. However, this can vary under certain circumstances.

The Department of Environmental Regulation's *Guidance Statement on Land Use Planning* (2015) outlines an implementation approach where environmental regulation and planning approval is required.

(c) Noise sensitive premises are defined in the *Environmental Protection (Noise) Regulations 1997*. The regulations define noise sensitive premises and outline allowable noise impacts on these areas. Under the regulations assigned noise levels for sensitive premises are informed by zonings in planning schemes. The definition is generally consistent with the definition of 'sensitive land uses' used in this policy.

(d) The clearing provisions of the *Environmental Protection Act 1986* require that the Chief Executive Officer has regard to planning instruments when making a decision on a clearing permit application. Planning instruments include State Planning Policies, planning schemes and local planning strategies. Clearing native vegetation is prohibited, unless undertaken with a clearing permit, or the clearing is for an exempt purpose. The first type of exemption is found in Schedule 6 of the *Environmental Protection Act 1986* and mainly refers to clearing that is required under other laws. The second type of exemption is found in the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* and mainly refers to clearing for routine low impact land management practices. Unless exempt, development applications may require a clearing permit.

(e) There are nineteen separate regulations that fall under the *Environmental Protection Act 1986*. These relate to matters such as abattoirs, abrasive blasting, rural landfill, packaged fertiliser and concrete batching. This policy does not duplicate these regulations, but provides a framework for planning decision-making that is cognisant of other regulatory requirements. As there is no regulation that specifically deals with odour, this policy provides direction on the matter.

(f) The Environmental Protection Authority's *Environmental Protection Guidance Statement No. 3: Separation Distances between Industrial and Sensitive Land Uses* provides guidance on recommended separation distances between many rural land uses and sensitive land uses. This guidance statement assists in the determination of land use buffers and planning decision-making.

(g) A range of rural land uses are not 'Prescribed Premises' under the *Environmental Protection Regulations 1987*, though they may still generate environmental impacts. This includes poultry farms, crushing and screening components of basic raw material extraction and composting under certain thresholds. These land uses and their impacts are regulated entirely by planning processes, and therefore require special consideration by planning decision-makers.[1]

(h) Schedule 2 of the *Health Act 1911* includes a list of 'Offensive Trades', including abattoirs, piggeries, rendering plants, tanneries and manure works. Part VII Division II of the Act requires local governments to approve and then register any offensive trades, and provides the ability for local governments to make local laws relevant to such trades. From a planning perspective, 'offensive' land use impacts can be managed by approvals issued by local governments under the *Health Act 1911*, in addition to planning controls. Registrations are renewed annually, and a local government may refuse to renew a registration if the premises are not operated in accordance with the relevant local laws. This provides an opportunity for local governments to manage and monitor the operation of 'offensive' premises.

(i) The Department of Health has *Guidelines for Separation of Agricultural and Residential Land Uses (2012)*, which seeks to minimise health and nuisance impacts from chemical use, spray drift and dust. Single residential dwellings located in land zoned Rural, Agricultural or equivalent in local and regional planning schemes are excluded from the guidelines. These guidelines articulate the Department of Health's position when providing advice on planning referral processes, where there are possible conflicts with existing agricultural land uses. In addition, the use of pesticides is regulated under the *Health (Pesticides) Regulations* (2011).

(j) Agencies and industry bodies may also produce guidelines and Codes of Practice to assist the industry in achieving well designed, located and managed rural activities and to reduce the potential for health, environment and nuisance related impacts on nearby land. Such guidelines may be an adjunct in the determination of land use buffers and planning decisions.

(k) The Department of Water seeks to conserve, protect, manage and assess water resources and provide for the sustainable use and development of water resources under the *Water Agencies (Powers) Act 1984*, *Rights in Water and Irrigation Act 1914* and *Waterways Conservation Act 1976*. Water resource availability is informed by allocation plans under the *Rights in Water and Irrigation Act 1914*, and is subject to allocation limits. The Department of Water's support for a plan or development would be influenced by whether or not water is available. If abstraction of the required water would result in significant environmental effects (such as impacts on native vegetation, wetlands or waterways), the Department of Water may need to refer the proposal to the Environmental Protection Authority under s38 of the *Environmental Protection Act 1986*.

Public drinking water source areas are defined by the Department of Water and proclaimed as water reserves, catchment areas or underground water pollution control areas under the *Metropolitan Water Supply, Sewerage and Drainage Act (1909)*, or water reserves or catchment areas under the *Country Areas Water Supply Act (1947)*. Land use and development in public drinking water source areas is guided by the WAPC's *State Planning Policy 2.7: Public Drinking Water Source Policy, State Planning Policy 2.2: Gnangara Groundwater Protection, State Planning Policy 2.3: Jandakot Groundwater Protection, and State Planning Policy: 2.9 Water Resources;* through sub-regional planning frameworks, region and local planning schemes.

(l) Documents prepared in relation to the Strategic Assessment of Perth and Peel under Part 10 of the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* are to be read in conjunction with this policy.

(m) Under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* approval is needed from the Commonwealth Minister for any proposal or action that has, will have or is likely to have a significant impact on any of the matters of environmental significance.

(n) *State Planning Policy 2: Environment and Natural Resources*, *State Planning Policy 2.1: Peel-Harvey Coast*

1 The *Biosecurity and Agriculture Management Act 2007* provides a basis for the *Biosecurity and Agriculture Management Plan (Stable Fly) Regulations 2013*. These apply in 13 urban and peri-urban local governments and may affect composting potential in those areas.

Plain Catchment, *State Planning Policy 2.7: Public Drinking Water Source Policy*; *State Planning Policy 2.9: Water Resources and State Planning Policy 2.10: Swan Canning River System* contain specific requirements for proposals within the catchment areas of estuaries, rivers, wetlands and other water bodies. These policies are to be read and applied in conjunction with this policy.

4 POLICY OBJECTIVES

The objectives of this policy are to:

(a) support existing, expanded and future primary production through the protection of rural land, particularly priority agricultural land and land required for animal premises and/or the production of food;

(b) provide investment security for existing, expanded and future primary production and promote economic growth and regional development on rural land for rural land uses;

(c) outside of the Perth and Peel planning regions, secure significant basic raw material resources and provide for their extraction;

(d) provide a planning framework that comprehensively considers rural land and land uses, and facilitates consistent and timely decision-making;

(e) avoid and minimise land use conflicts;

(f) promote sustainable settlement in, and adjacent to, existing urban areas; and

(g) protect and sustainably manage environmental, landscape and water resource assets.

5 POLICY MEASURES

The WAPC seeks to protect and preserve rural land for rural purposes including primary production, basic raw materials, regional facilities, and protection of biodiversity and landscape. Rural land accommodates a diverse range of land uses, primarily associated with primary production. There are also rural areas with suitable soils, climate, water (rain or irrigation) and access to services such that the land is considered to be high quality agricultural land. The intent of this policy is therefore to protect rural land and encourage a diversity of compatible rural land uses.

There is generally an existing supply of suitably sized and located rural lots to cater for intensive and emerging primary production land uses. Creation of new rural lots through ad hoc, unplanned subdivision is inconsistent with the objectives of this policy.

5.1 Protection of rural land and land uses

The WAPC will seek to protect rural land as a State resource by:

(a) requiring that land use change from rural to all other uses be planned and provided for in a planning strategy or scheme;

(b) retaining land identified as priority agricultural land in a planning strategy or scheme for that purpose;

(c) ensuring retention and protection of rural land for biodiversity protection, natural resource management and protection of valued landscapes and views;

(d) protecting land, resources and/or primary production activities through the State's land use planning framework;

(e) creating new rural lots only in accordance with the circumstances under which rural subdivision is intended in *Development Control Policy 3.4: Subdivision of rural land*;

(f) preventing the creation of new or smaller rural lots on an unplanned or ad-hoc basis, particularly for intensive or emerging primary production land uses;

(g) comprehensively planning for the introduction of sensitive land uses that may compromise existing, future and potential primary production on rural land; and

(h) accepting the impacts of well-managed primary production on rural amenity.

5.2 Rural land in the Perth and Peel planning regions

The Perth and Peel planning regions will continue to accommodate the majority of the State's population growth. Rural land will become more contested, as the land may be required for environmental protection, basic raw material extraction, infrastructure or urban purposes. Opportunities for additional rural living zoning will become more limited.

WAPC policy for rural land in the Perth and Peel planning regions is:

(a) rural residential proposals for rural land that do not align with endorsed sub-regional planning frameworks are considered inconsistent with the policy objectives and shall not be supported;

(b) rural smallholdings proposals for rural land will be considered by exception in planning strategies and schemes, where topography, biodiversity values,

bushfire risk, environmental matters and servicing can be managed in accordance with this and other State policies;

(c) established rural land uses of State significance, including animal premises and food processing facilities, should be protected from urban and rural living encroachment due to their critical food production and economic roles;

(d) priority agricultural land is to be preserved for that purpose due to its proximity to major population centres; and

(e) conversion of land from priority agriculture to other uses must be appropriately planned in strategies or schemes, where such conversion is required as a matter of State significance.

5.3 Rural living

The WAPC recognises there is a market for rural living development, and that it provides for a range of housing and lifestyle opportunities. However, rural living estates must be carefully planned, as they can be an inefficient means of accommodating people. Once rezoned, rural living estates consume and sterilise what was rural land, and may have unintended or adverse social, environmental, servicing or management impacts.

State Planning Policy 3 Urban Growth and Settlement provides strategic direction for settlement planning in Western Australia and specific guidance in relation to establishing rural living estates or areas where rural living is to be developed. For the purposes of this policy, a rural living proposal is:

- the designation of rural living precincts in a local planning strategy, scheme or structure plan; or
- an amendment to a strategy or scheme to provide for, or extend, a rural living precinct; or
- a subdivision application for land zoned for rural living purposes.

The following policy measures apply in regard to decision-making for rural living proposals:

(a) rural living proposals shall not be supported where they conflict with the objectives of this policy or do not meet the criteria listed at 5.3 (b) and (c);

(b) the rural living precinct must be part of a settlement hierarchy established in an endorsed planning strategy;

(c) the planning requirements for rural living precincts are that –

(i) the land be adjacent to, adjoining or close to existing urban areas with access to services, facilities and amenities;

(ii) the proposal will not conflict with the primary production of nearby land, or reduce its potential;

(iii) areas required for priority agricultural land are avoided;

(iv) the extent of proposed settlement is guided by existing land supply and take-up, dwelling commencements and population projections;

(v) areas required for urban uses are avoided;

(vi) water supply shall be as follows –

– where lots with an individual area of four hectares or less are proposed and a reticulated water supply of sufficient capacity is available in the locality, the precinct will be required to be serviced with reticulated potable water by a licensed service provider. Should an alternative to a licensed supply be proposed it must be demonstrated that a licensed supply is not available; or

– where a reticulated supply is demonstrated to not be available, or the individual lots are greater than four hectares, the WAPC may consider a fit-for-purpose domestic potable water supply, which includes water for fire fighting. The supply must be demonstrated, sustainable and consistent with the standards for water and health; or

– the development cannot proceed if an acceptable supply of potable water cannot be demonstrated;

(vii) electricity supply shall be as follows –

– where a network is available the precinct is to be serviced with electricity by a licensed service provider, or

– where a network is not available, the precinct is to be serviced by electricity from renewable energy source/s, by a licensed service provider, and this has been demonstrated;

(viii) the precinct has reasonable access to community facilities, particularly education, health and recreation;

(ix) the land is predominantly cleared of remnant vegetation, or the loss of remnant vegetation

through clearing for building envelopes, bushfire protection and fencing is minimal and environmental values are not compromised;

(x) the proposal demonstrates and will achieve improved environmental and landscape outcomes and a reduction in nutrient export in the context of the soil and total water management cycle, which may include rehabilitation as appropriate;

(xi) the land is capable of supporting the development of dwellings and associated infrastructure (including wastewater disposal and keeping of stock) and is not located in a floodway or an area prone to seasonal inundation;

(xii) the land is not subject to a separation distance or buffer from an adjoining land use, or if it is, that no sensitive land uses be permitted in the area of impact;

(xiii) the lots can be serviced by constructed road/s capable of providing access during all weather conditions, including access and egress for emergency purposes; and

(xiv) bushfire risk and natural hazards can be minimised and managed in accordance with State policy, without adversely affecting the natural environment. Proposals in areas of extreme bushfire risk will not be supported;

(d) development standards for rural living zones are to be included in local planning schemes;

(e) further subdivision of existing rural living lots into smaller parcels is not supported, unless provided for in a local planning strategy and/or scheme; and

(f) rural strata proposals with a residential component are considered to be rural living and will be considered in accordance with the criteria listed at clauses 5.3 (a), (b) and (c) of this policy.

Where there may be a conflict between endorsed planning strategies, the higher order and/or more recent document shall prevail.

5.4 Rural lots that may be created under the exceptional circumstances of *Development Control Policy 3.4: Subdivision of rural land*

Many rural lots in Western Australia were created prior to planning legislation and policy. Former townsites that are no longer settled may also have converted to rural zoning. As a result there is a vast array of rural lot sizes, including many small rural lots that are incapable of supporting primary production. Although these lots are small, and may be used primarily for residential purposes, they are not rural living lots as they are not identified or zoned as such, and they remain rural lots.

Development Control Policy 3.4: Subdivision of rural land outlines the range of exceptional circumstances where the WAPC will consider the subdivision of rural land, particularly where such subdivision may achieve land management, environmental, social or cultural benefit.

There is potential for rural subdivision to result in the creation of rural lots which are similar in size to lots in rural living zones, where residential use is the likely or intended long-term purpose. In such cases, WAPC policy is:

(a) the form of subdivision must be capable of approval under the exceptional circumstances and requirements of *Development Control Policy 3.4: Subdivision of rural land*;

(b) the resultant lot/s will not interfere with primary production, will have legal access to a constructed road and will achieve sound environmental outcomes; and

(c) the lot/s are not to be zoned for rural living.

5.5 Regional variation, economic opportunities and regional development

Western Australia is a large and diverse State with regional variations of climate, economic activity, cultural values, demographic characteristics and environmental conditions. The WAPC's decisions will be guided by the need to provide economic opportunities for rural communities and to protect the State's primary production and natural resource assets. WAPC policy is to:

(a) continue to promote rural zones in schemes as flexible zones that cater for a wide range of land uses that may support primary production, regional facilities, environmental protection and cultural pursuits;

(b) support small rural communities by providing for rural enterprise zones which combine light industry and housing, provided they are carefully planned; in general proximity to urban areas; serviced; and have design features that address buffers and amenity;

(c) support small scale tourism opportunities, such as bed and breakfast, holiday house, chalet, art gallery, micro-brewery and land uses associated with primary production, within the rural zone; and

(d) recognise the differing needs of the various regions, and consider regional variations where they meet the stated objectives of this policy and are supported in strategies and schemes.

5.6 Tree farming

Tree farming is an umbrella term used to describe the planting of trees to generate economic return and/or environmental benefits. It has been a rapidly emerging industry in a number of rural locations across the State. Usually this has involved the planting of trees for harvest. However, more recently the planting of trees for carbon sequestration has emerged as a new rural land use. Tree farming which involves harvesting is a primary production activity that also sequesters carbon. The different types of tree farms, i.e. integrated, chip logs or saw logs, require varied planning approaches.

WAPC policy in regard to tree farming is:

(a) tree farming is supported and encouraged on rural land as a means of diversifying rural economies and providing economic and environmental benefit;

(b) tree farming should generally not occur on priority agricultural land;

(c) tree farming should generally be a permitted use on rural land, except where development of a tree farm would create an extreme or unacceptable bushfire risk or when responding to specific local circumstances as identified in a strategy or scheme;

(d) local governments should manage the location, extent and application requirements for tree farming in their communities through local planning strategies, schemes and/or local planning policies;

(e) in planning for tree farming, local government considerations should include but are not limited to, potential bushfire risk, environmental and economic factors, water availability and recharge, visual landscape impacts, transport impacts of tree farming (where harvesting is proposed), planting thresholds, appropriate buffers, and location relative to conservation estates and sensitive land uses;

(f) where tree farm proposals are integrated with farm management for the purpose of natural resource management and occupy no more than 10 per cent of the farm, the proposal should not require local government development approval; and

(g) the establishment of tree farms does not warrant the creation of new or smaller rural lots.

5.7 Animal premises

Animal premises are important contributors to the food needs of Western Australia's residents and to the State's economy. In order to operate effectively they require ready access to consumers, access to services and freight, appropriate environmental or climatic conditions, and the ability to respond to changes in the market. As a result, animal premises are generally located in the vicinity of road, rail and port infrastructure and population centres. Relocation of existing animal premises away from approaching urban fronts will not be possible for all businesses, nor is it a reasonable expectation.

Many animal premises are subject to environmental regulation, but others, most notably poultry farms, are not. Where animal premises are not subject to environmental regulation, planning decision-makers may need to consider a broader range of environmental factors and resolve potential land use conflict.

WAPC policy in regard to animal premises is:

(a) animal premises are a rural land use, and are generally supported and encouraged on rural land provided rural amenity and environmental impacts can be effectively managed;

(b) animal premises that require large sites or buffers, and could limit existing or potential industrial land uses, should generally not be located in State strategic industrial areas or within their buffers;

(c) expansion of existing animal premises may be supported where off-site impacts (such as odour, dust or noise) are mitigated or managed to achieve maintenance or reduction of impacts, in accordance with an accepted code of practice;

(d) in addition to environmental issues, planning decision-makers must consider the following matters in assessing proposals –

  (i) the staging of the proposal and ultimate design capacity;

  (ii) the transport of animals to and from the site;

  (iii) the handling and disposal of deceased or 'retired' animals on or off-site;

  (iv) the transport, handling and/or disposal of animal feed and/or waste on or off-site;

  (v) outdoor pens or roaming areas for animals;

  (vi) the potential impacts of operating hours;

  (vii) shed configuration, including rotation and/or automation;

  (viii) servicing, including location and size of effluent disposal ponds; and

(ix) biosecurity (based on advice from the industry); and

(e) where an animal premises proposal may affect the nutrient load of a river, estuary or associated tributary and the system and/or its receiving water body has no further capacity to assimilate nutrients without an adverse impact on ecosystem health, a reduction in nutrient export is to be demonstrated.

5.8 Intensive agriculture

Intensive agricultural products are important contributors to the State's economy and are sold to domestic and export markets. Several localities in Western Australia produce much of the State's produce, including Carabooda, Gingin Brook, Perth Hills, Nowergup, Myalup, Manjimup, Donnybrook, Margaret River, Carnarvon, and Ord River. In addition, there are other dedicated sites that may produce a high percentage of a particular commodity in the context of State supply.

In order to operate effectively, producers may require areas of high agricultural productivity, water availability, suitable climatic conditions and ready access to markets and freight networks.

WAPC policy in regard to intensive agriculture is:

(a) intensive agriculture is generally supported and encouraged on rural land provided rural amenity and environmental impacts can be effectively managed;

(b) intensive agriculture sites of State significance should be protected from encroachment;

(c) in considering buffer distances between intensive agriculture and sensitive land uses, the requirements of clause 5.12 should be observed, and the following matters may also affect the buffer –

(i) types of chemicals used and their method of application;

(ii) the characteristics of the site/s, including vegetation, topography and prevailing winds;

(iii) potential mitigation approaches, including fencing, vegetation buffers, open space, road reserves and other compatible uses; and

(iv) potential staging and/or expansion intention of the intensive agriculture operator; and

(d) where an intensive agriculture proposal may affect the nutrient load of a river, estuary or associated tributary and the system and/or its receiving water body has no further capacity to assimilate nutrients without an adverse impact on ecosystem health, a reduction in nutrient export is to be demonstrated.

5.9 Basic raw materials outside the Perth and Peel planning regions

Basic raw materials are essential for the construction of buildings, roads and other infrastructure, and also for the sustainability of agricultural production.

Identification of basic raw material sites does not presume that extraction would be environmentally acceptable or that subsequent approval for extraction would be guaranteed. Nor does it remove the requirement of local government authorities or proponents to meet their obligations to identify those environmental constraints which may determine the extent and/or manner in which a proposal may be implemented.

WAPC policy for basic raw materials located outside the Perth and Peel planning regions is:

(a) Significant Geological Supplies and their buffers are not to be developed for other purposes until the resource is extracted, or unless development is compatible with the future extraction of the resource;

(b) Significant Geological Supplies and significant basic raw material resources, and an indicative separation distance or buffer, should be identified in sub-regional and/or local planning strategies;

(c) region and local planning schemes should identify Significant Geological Supplies and significant basic raw material resources, and include provisions for their protection, access and use;

(d) basic raw material resources and sites should be identified in local planning strategies and schemes as required;

(e) region and local planning schemes should not generally prohibit the extraction of basic raw material resources;

(f) sequential land use planning is encouraged whereby extraction and appropriate rehabilitation can take place on a programmed basis in advance of longer-term use and development;

(g) sensitive zones and/or land uses may be approved where it can be demonstrated they will not limit the existing or potential extraction of basic raw materials;

(h) where a basic raw material resource is located with native vegetation or significant biodiversity values, extraction of the resource may require referral under Part IV or Part V of the *Environmental Protection Act 1986*. Environmental regulation of the proposal may require vegetation retention and/or protection of other environmental assets;

(i) planning decision-makers are to have due regard to advice from environmental agencies and consider potential impacts on fragmentation and connectivity of remnant vegetation; and

(j) where a basic raw material resource is located in a public drinking water source area, extraction of the resource may be subject to achieving separation distances to the groundwater table to protect water quality. Separation distances from water supply infrastructure, and other management measures to protect water quality, should be applied in planning decision-making.

5.10 Managing and improving environmental and landscape attributes

The planning system is well-placed to address environmental and landscape values when land use change is contemplated, to ensure that negative impact from development is minimised.

Environmental and landscape attributes will be managed and improved by:

(a) supporting and promoting private conservation areas within Western Australia in addition to State and local government conservation reserves;

(b) supporting the establishment of environmental corridors in strategies and schemes, including connection of State and local reserves and waterways and wetlands within private conservation areas;

(c) considering future ownership and management arrangements prior to the zoning of land for conservation purposes;

(d) supporting rural living proposals with a conservation theme that result in improved environmental outcomes, where that land is identified as suitable for future rural living subdivision in a strategy or scheme, in accordance with the policy requirements of clauses 5.2 and 5.3;

(e) supporting the inclusion into strategies and schemes of provisions that promote protection of valued landscape and views, as required; and

(f) making planning decisions that support the protection of water resources and their dependent environments in order to maintain or improve water quality.

5.11 Regional facilities

Some rural land may be suitable to accommodate facilities that serve a regional or sub-regional catchment. This could include regional attractors or facilities such as sporting or entertainment venues, places of worship, prisons, cemeteries and waste facilities.

As these land uses serve a regional or sub-regional function, the WAPC recommends that sites for regional facilities be subject to scheme amendment processes to allow for early environmental referral and public advertising.

Where amendments are proposed, or in situations where a development application is lodged, the following requirements apply:

(a) facilities should be located on a main road or on a road that is of a suitable standard and treatment, to accommodate significant increase in traffic volumes and freight tasks which may be generated by the proposal;

(b) facilities should contain or satisfactorily manage potential environmental (including water resources), noise, amenity and air quality impacts on the landholding without affecting nearby rural land uses;

(c) facilities should not be visually dominant within key viewsheds, and should be visually compatible with surrounding land uses and development; and

(d) facilities should be provided with essential services commensurate with the intended land use.

5.12 Preventing and managing impacts in land use planning

One of the key elements in achieving the objectives of this policy is ensuring that zones and sites are suitable for their intended purpose. As a result, at each stage of the planning framework, planning decision-makers need to consider the broad suitability of land uses and the ability to manage offsite impacts prior to determining whether the use of a buffer is necessary.

5.12.1 Avoiding land use conflict

Planning decision-makers shall take the following approach to avoid land use conflict:

(a) where an existing land use that may generate impacts is broadly compatible with surrounding zones and land uses, a separation distance should be indicated in a local planning strategy so there is broad awareness of the land use;

(b) where a development is proposed for a land use that may generate off-site impacts, there should be application of the separation distances used in environmental policy and health guidance,

prescribed standards, accepted industry standards and/or Codes of Practice, followed by considering –

(i) whether the site is capable of accommodating the land use; and/or

(ii) whether surrounding rural land is suitable, and can be used to meet the separation distances between the nearest sensitive land use and/or zone, and would not limit future rural land uses; and

(iii) whether if clauses (i) and/or (ii) are met, a statutory buffer is not required;

(c) where a development is proposed for a land use that may generate off-site impacts and does not meet the standard outlined in clause 5.12.1 (b) then more detailed consideration of off-site impacts will be required, in accordance with clause 5.12.3 of this policy; and

(d) where a development is proposed that could be contemplated in the zone, and has been assessed under clause 5.12.3 as having unacceptable off-site impacts that cannot be further mitigated or managed, the proposal should be refused.

5.12.2 Planning approach for sensitive land uses in rural zones potentially affected by a rural land use

This policy seeks to limit the introduction of sensitive land uses that may compromise existing and future primary production on rural land. In considering these zones and land uses, WAPC's position is that:

(a) single dwellings on rural land are a sensitive land use;

(b) single dwellings and other sensitive land uses on rural land should be afforded a reasonable standard of rural amenity;

(c) the introduction of single dwellings and other sensitive land uses should not occur where they would limit primary production;

(d) the extent of a sensitive land use on rural land is a distance (as opposed to the property boundary) from the perimeter of the use that provides a reasonable standard of rural amenity;

(e) where primary production sites require caretakers' dwellings for management or operational purposes, these dwellings should not be considered a sensitive land use, noting that occupational health and workplace safety requirements will apply;

(f) rural land uses are compatible with the preservation of rural character and amenity in rural zones;

(g) where single dwellings or other sensitive land uses are proposed in an area potentially impacted by a primary production site of State significance, prospective purchasers may be advised of potential impacts by notifications on title at subdivision stage.

5.12.3 Determining a buffer

In addition to those matters required under a scheme, where detailed consideration of off-site impacts is required in accordance with clause 5.12.1 (c), determination of a buffer should, take into account:

(a) separation distances recommended in Government policy and guidance;

(b) whether the design and/or operation of the proposal is in accordance with prescribed standards, accepted industry standards or codes of practice;

(c) whether, prior to issuing an approval, any management plans associated with the proposal are capable of being implemented;

(d) the existing or potential requirement for environmental licensing and/or works approval;

(e) potential cumulative impacts;

(f) whether modelling is required where impacts on sensitive land uses outside the property boundary are anticipated to exceed the parameters used in environmental policy, prescribed standards, accepted industry standards and/or codes of practice; and

(g) odour modelling, when required, is to be undertaken in accordance with a methodology outlined in Government policy or guideline, or an agreed equivalent, by the proponent of the primary production or the proponent of the sensitive zone or land use.

5.12.4 Planning approach for buffers

Where a buffer has been determined in accordance with clause 5.12.3 and off-site impacts can be managed by planning controls, planning decision-makers should adopt the following approach as applicable:

(a) for a scheme review or amendment, generally a statutory buffer should be applied and take the form of a special control area with related scheme provisions;

(b) for a structure plan, designate buffers, noting that their effect is one of 'due regard';

(c) for a subdivision, include a condition that notifies prospective purchasers of either a statutory buffer, or a land use that may affect residential amenity; and

(d) for a development application, the requirements of clause 5.12.1 (b) must be satisfied, as it is not possible to implement a statutory buffer through a development application. Where clause 5.12.1 (b) cannot be satisfied, a scheme amendment may be required.

Where the right to construct a single dwelling on rural land exists in a scheme, it cannot be extinguished over the entire site by a statutory buffer.

5.12.5 Planning approach for managing land use transition

Rural land may transition to other zones, such as urban, residential, commercial and industrial. In such cases, it is necessary for land use transition to be managed, such that existing operators can continue to function and new landowners have reasonable expectations. In such cases, WAPC policy is:

(a) where an area is transitioning from a rural zoning to urban, buffers may be required during the transition, to manage the change and allow producers to continue operations until such time as production ceases or relocation occurs;

(b) where an area is transitioning from a rural zoning and the producers plan to relocate before rezoning, structure planning or subdivision occur, proponents are to provide evidence of the intended closure, such as a statutory declaration, written undertaking by the producer, unconditional offer and acceptance for the sale of the property, or removal of the agricultural infrastructure. In these circumstances a buffer need not be applied;

(c) prospective purchasers of properties affected by a buffer may be advised of the existence of a rural land use through a condition of subdivision; and

(d) in accordance with clause 5.2 (c) of this policy, rural land uses of State significance are to be given due regard in decision-making.

6 IMPLEMENTATION

This policy is given effect by the *Planning and Development Act 2005*. The appropriate planning instruments to protect rural land and land uses are State and regional strategies, region schemes, local planning strategies, local planning schemes, local planning policies, structure plans, subdivision and development applications.

As a general principle, rural land and land uses should be considered at each stage of the planning framework, increasing in detail at each level.

6.1 Regional strategic planning for rural land

Regional planning strategies should identify:

(a) primary production sites that service the region or beyond;

(b) priority agricultural land;

(c) the location of Significant Geological Supplies;

(d) areas of known and important mineral and petroleum resources;

(e) regionally significant biodiversity, landscape and environmental assets, including water resources; and

(f) key regional transport routes for transporting agricultural products, basic raw materials, mineral products and other resources.

6.2 Sub-regional and local strategic planning for rural land

Sub-regional and local planning strategies should:

(a) provide more detailed consideration and guidance in relation to the matters listed at 6.1 of this policy;

(b) only identify land for rural living zones in accordance with *State Planning Policy 3: Urban Growth and Settlement* and clauses 5.2 and 5.3 of this policy;

(c) only identify rural land for conversion to other land uses when consistent with the objectives of this policy;

(d) indicate separation distances and/or buffers for land uses where necessary; and

(e) provide soil and land capability information regarding the risk of nutrient export where land uses may generate increased nutrient loads in rivers, estuaries or their tributaries.

6.3 Rural land in local planning schemes

When local planning schemes are prepared or reviewed, planning decision-makers shall:

(a) provide more detailed consideration and guidance to respond to the matters listed at clauses 6.1 and 6.2 of this policy;

(b) in rural zones, limit the introduction of land uses that may constrain existing or potential future rural land uses;

(c) only categorise land uses as permissible in rural zones if they are consistent with the objectives of this policy and a local planning strategy;

(d) generally designate animal premises as 'permitted' or 'discretionary' uses; and

(e) consider whether sensitive land uses in rural zones serve a secondary function to the purpose of the land for primary production, environment and landscape, and whether they should not be 'permitted' uses in planning schemes.

6.3.1 Use of the terms 'noxious' and 'hazardous' in schemes

A number of schemes describe some land uses as 'noxious' and 'hazardous', based on definitions from environmental and health legislation. When used out of context in planning schemes, these terms imply that, when developed, the land uses will be noxious and hazardous. However, environmental, health and planning controls may have the combined effect of managing impacts to acceptable levels.

WAPC policy is that:

(a) the terms 'noxious' and 'hazardous' should not be used in region and local planning schemes;

(b) the terms 'noxious' and 'hazardous' should be removed from schemes when they are reviewed and be replaced by definitions that more accurately describe the land use;

(c) applications for animal premises should not be assessed as 'noxious' or 'hazardous' industries in the land use zoning table; and

(d) where these terms occur in existing schemes, and no other land uses could reasonably be applied to a proposal, the land use should be dealt with as a 'use not listed' and assessed under the zone objectives.

6.4 Zoning proposals affecting rural land

In contemplating zoning proposals or amendments to region or local planning schemes, planning decision-makers shall consider:

(a) the suitability of the site to be developed for the proposed use;

(b) the siting of the zone/land use in the context of surrounding zones/land uses (existing and proposed);

(c) the capacity of the site to accommodate the proposed zone/land use and associated impacts and:

  (i) only support proposals which are consistent with endorsed planning strategies, or in exceptional circumstances, where the proposal meets the objectives and intent of WAPC policy;

  (ii) only support the introduction of sensitive zones that may affect the existing and future operation of primary production where the management of impacts and/or mitigation approaches have been substantively resolved and are not wholly deferred to later stages of planning;

  (iii) that the continuation of existing rural land uses are taken into account;

  (iv) ensure that lifting of urban deferred land in a region scheme is in accordance with clause 6.4 (b);

  (v) ensure that the sensitive zone does not overlap with any buffer determined to be necessary as a result of introducing the new zone, and the area within the buffer should retain its rural zoning until such time as the buffer is no longer required; and

  (vi) ensure that adequate land is identified to contain impacts from existing primary production, before introducing sensitive or industrial zones on rural land.

6.5 Subdivision

It is the view of the WAPC that there are sufficient, suitably sized and located rural lots to cater for intensive and emerging primary production land uses. Creation of new rural lots through ad-hoc, unplanned subdivision will not be permitted.

In contemplating subdivision proposals on rural land, WAPC policy is:

(a) the creation of new or smaller rural lots will be by exception and in accordance with *Development Control Policy 3.4: Subdivision of rural land*;

(b) the creation of new or smaller rural lots by exception may be provided for in other State Planning Policies and/or a local planning strategy or scheme;

(c) no other planning instruments besides those listed at (a) or (b) can provide for the subdivision of rural land; and

(d) the introduction of new dwelling entitlements or other sensitive land uses should not limit or prevent primary production from occurring.

6.5.1 Servicing conditions

Electricity

For rural and rural living subdivisions, WAPC policy is for electricity supply to be commensurate with the intended land use.

The policy measures are:

(a) subdivisions involving housing, particularly in a rural residential zone, will generally require a network electricity supply;

(b) where lots created as a result of a subdivision for a homestead lot, a conservation lot or boundary realignment do not require a power connection to support the land use, an electricity supply condition may not be applied;

(c) where an existing power connection to a lot is confirmed as meeting safety requirements, an electricity supply condition may not be applied, or may be cleared;

(d) where connection to a network electricity supply requires an infrastructure upgrade that is not commensurate with the scale of the proposal, the WAPC may not impose, or may clear, a condition of subdivision requiring an electricity supply, provided that:

  (i) a notification is placed on title advising that an electricity supply is not supplied to the lot/s; or

  (ii) the subdivider voluntarily places a notification on title advising that an electricity supply is not supplied to the lot/s; and

  (iii) it is demonstrated that the lot can be serviced by renewable energy source/s;

(e) where a proposal would intensify development, and there is existing electricity supply infrastructure that traverses the lots/s, the WAPC may require removal or relocation of infrastructure.

Wastewater disposal

For rural and rural living subdivisions, WAPC policy is:

(a) on-site wastewater disposal is generally acceptable, subject to the appropriate separation from buildings, watercourses, water bodies and/or drinking water sources being demonstrated.

Water supply

The policy provisions relevant to water supply for rural living proposals are outlined in clause 5.3 of this policy.

For rural subdivisions, WAPC policy is:

(a) where subdivision of rural land occurs in accordance with this policy, a notification may be placed on title where a licensed water supply is not available; and

(b) a proposed lot may rely on a Service by Agreement supply or rainwater.

6.6 Development

Section 67 of the *Planning and Development (Local Planning Schemes) Regulations 2015* outlines the range of matters to be considered by local governments in determining applications for development approval.

6.7 Local planning policies

Local governments may prepare local planning policies to supplement or elaborate on issues associated with this policy. The scope and effect of local planning policies is outlined in the *Planning and Development (Local Planning Schemes) Regulations 2015*.

6.8 Rural Planning Guidelines

The WAPC's Rural Planning Guidelines provide guidance and further detail for implementing this policy.

GLOSSARY OF TERMS

The terms used in this policy are defined in this section. Some are sourced from the *Planning and Development (Local Planning Schemes) Regulations 2015*. Definitions contained in this policy also apply to *Development Control Policy 3.4: Subdivision of rural land*.

Term	Definition
Abattoir	As per the *Planning and Development (Local Planning Schemes) Regulations 2015*.
Agriculture – extensive	As per the *Planning and Development (Local Planning Schemes) Regulations 2015*.
Agriculture – intensive	As per the *Planning and Development (Local Planning Schemes) Regulations 2015*.
Agricultural land use / agricultural purposes	A subset of rural land used specifically for agricultural purposes including agriculture – extensive, agriculture – intensive, pastoral uses, plantations and agro forestry. May include industry – primary production. Does not include rural living.
Alternative servicing	Provision of services including drinking water, power and sewage disposal by a householder or other body, as opposed to a licensed provider.
Alternative water supply	Water supplied by means other than a licensed water service provider (such as the Water Corporation). Includes potable water for domestic use (where it is approved by the Department of Health) and either potable or non-potable water for fire fighting, including the maintenance of fire retardant vegetation and gardens.
Animal establishment	As per the *Planning and Development (Local Planning Schemes) Regulations 2015*.
Animal husbandry – intensive	As per the *Planning and Development (Local Planning Schemes) Regulations 2015*.
Animal premises	An umbrella term which covers the following rural land uses: abattoirs, animal husbandry – intensive (including poultry farms and piggeries), rendering plants and sale yards. Does not include animal establishments, catteries or kennels.
Basic raw materials	Sand (including silica sand), clay, hard rock, limestone (including metallurgical limestone), agricultural lime, gravel, gypsum and other construction and road building materials. The materials may be of State, regional or local significance depending on the resource location, size, relative scarcity, value and demand for the product.
Buffer	The strategic or statutory designation of land in which sensitive land uses are constrained or prohibited. The extent of a buffer comprises the following elements: • the type and scale of the proposal • Government policy on separation distance • existing or potential requirement for environmental licensing and/or works approval • industry-specific guidelines • technical studies • potential cumulative impacts • amenity, visual impact • environmental and topographic features • cadastre • the continuation and/or expansion of the land use in the context of surrounding land uses. A buffer is measured from activity to activity, and does not necessarily relate to cadastral boundaries. A strategic buffer is one shown in a local planning strategy or other strategic planning document. A statutory buffer is one shown in a region or local planning scheme where there are land use planning controls that give effect to the buffer.
Carbon sequestration	Capture and storage of carbon in a manner that prevents it from being released into the atmosphere. Often occurs through tree planting.
Code of practice	Written guidelines issued by an official body or a professional association to its members to express the preferred operating standards for the business.

Term	Definition
Conservation estate	Land with significant conservation values, reserved (or proposed to be reserved) under the National Reserve System or through the *Conservation and Land Management Act 1984*.
Environmental corridors	A network of native vegetation that maintains some of the ecological functions of natural areas and counters the effects of habitat fragmentation (adapted from the Environmental Protection Authority's Guidance Statement No. 33).
High-quality agricultural land	Land that is identified in a dataset generated by the agency responsible for agriculture and food, based on land capability, water and climate.
Hobby farm	See Rural Pursuit.
Identified biodiversity values	A formal indication that the biodiversity values of a site are such that the site should be subject to some form of protection. This could include, but is not limited to, a matter of significance under the *Environmental Protection and Biodiversity Conservation Act 1999*, a policy or advice from the Environmental Protection Authority or other environmental agency, and a local biodiversity strategy.
Industry – extractive	As per the *Planning and Development (Local Planning Schemes) Regulations 2015*.
Industry – primary production	As per the *Planning and Development (Local Planning Schemes) Regulations 2015*.
Landscape or bushland protection zone	A land use zone with conservation as the predominant land use. May be a subset of rural living characterised by clustering of residential development/land use on a land parcel(s) containing areas of high environmental and/or landscape value. Also refers to zones including bushland conservation, rural landscape, and rural conservation.
Licensed service provider	A provider of services such as electricity, water or wastewater disposal, licensed by the Economic Regulation Authority in accordance with the licensing schemes set out in the *Electricity Industry Act 2004, Energy Coordination Act 1994* and the *Water Services Act 2012*.

Term	Definition
Local planning strategy	A strategy prepared under the *Planning and Development (Local Planning Schemes) Regulations 2015* Part 3, as amended from time to time, which sets out the long-term planning directions for a local government, applies State and regional planning policies, and provides the rationale for the zones and other provisions of the local planning scheme.
Locally significant	A land use, area or issue that is of significance to a local government, district or townsite by virtue of any or all of the economic, social, cultural or environmental values for that land use, area or issue.
Main road	A road that provides for major regional and inter-regional traffic movement and carries large volumes of generally fast moving traffic.
Natural resources	Resources supplied by nature. These are commonly classified into non-renewable resources, such as minerals and petroleum, and renewable natural resources that propagate or sustain life and are naturally self-renewing when properly managed, including plants and animals as well as soil and water.
Off-site impacts	Impacts such as odour, noise, spray drift, vibration, dust, groundwater, air pollution or light spill that cannot be contained within a property boundary. These are impacts which remain after mitigation and management to regulatory and/or policy standards.
Pastoral land and purposes	As per part 7 of the *Land Administration Act 1997*.
Peri-urban	A general term used to describe land on the outskirts of a major urban area or capital city e.g. Perth, Geraldton, Northam, Kalgoorlie, Bunbury, Albany. Peri-urban land located between the suburbs and the countryside. Combination of the words peripheral and urban. Refers to a general location and is not a land use.
Piggery	A subset of animal premises relating to any land or buildings used for the rearing or keeping of pigs.
Poultry farm	A subset of animal premises relating to any land or buildings used for the rearing or keeping of poultry for either egg or meat production.

Term	Definition
Primary production	The carrying out of a business that: cultivates or propagates plants; maintains animals; takes or cultivates aquatic organisms, extracts basic raw materials, and plants, tends, fells and/or transports trees or parts thereof for sale or remuneration. It includes intensive and extensive agriculture, animal husbandry – intensive, animal premises, industry – extractive, tree farms and plantations.
Priority agricultural land	Land of State, regional or local significance for food production purposes due to its comparative advantage in terms of soils, climate, water (rain or irrigation) and access to services. Priority agricultural land is derived from High Quality Agricultural Land data that has been subject to consultation and refinement, and has removed land required for existing and future urban/development areas, public use areas and land required for environmental purposes.
Private conservation areas	Areas with significant conservation value that may be identified in a strategy or scheme and/or zoned for conservation purposes, and are in private ownership.
Reasonable standard	The degree of reasonableness as outlined in the *Associated Provincial Picture Houses Ltd v Wednesbury Corporation (1947) 2 All ER 6802* decision and used to determine if a condition should not be imposed because it is so unreasonable that no reasonable body or persons could have made the decision.
Regional	Pertaining of, or to, a planning region as defined in the *Planning and Development Act 2005*.
Regional facilities	Land uses that serve a regional or sub-regional function, with a wide geographic catchment, and which may be suitable in rural areas and/or zones. Includes land uses such as landfills, cemeteries, prisons and places of worship, but does not include public utility infrastructure.
Regional or sub-regional planning strategy	A land use planning strategy, framework or structure plan, usually prepared by the Western Australian Planning Commission, which sets strategic direction over a planning region, sub-region, townsite or suburb. May include a spatial plan that provides a basis for future zoning.
Regionally significant	A land use, area or issue of significance to a planning region by virtue of any or all of the economic, social, cultural or environmental values for that land use, area or issue.

Term	Definition
Remnant vegetation	Vegetation which is either a remainder of the natural vegetation of the land that was present prior to European settlement, or, if altered, is still representative of the structure and floristics of the natural vegetation, and provides the necessary habitat for native species.
Renewable energy source	Any source of energy that can be used without depleting its reserves. This can include: • solar • wind • bioenergy, such as wood, agricultural crops and residues, animal wastes, and municipal solid (green) waste • hydropower • geothermal and hot dry rock • tidal and wave • alternative fuels such as ethanol and biodiesel
Rural amenity	A standard of residential amenity that is rural in nature, which may include impacts from primary production. May also include biodiversity conservation, natural resource management, some public purposes and protection of landscapes and views.
Rural enterprise zone	A predominantly light industrial zone, generally suitable in rural areas, that provides for light industrial land uses and an ancillary residential dwelling on one lot, with lot sizes in the order of one to four hectares. May also be known as rural industry or composite zones.
Rural home business	As per the *Planning and Development (Local Planning Schemes) Regulations 2015*.
Rural land	Land zoned or identified for agricultural or rural use in a region or local planning scheme or strategy.
Rural land use	Land uses that are rural in nature and that support and are associated with primary production, basic raw material extraction, biodiversity conservation, natural resource management, public purposes (eg. prisons, cemeteries, public utilities and waste management facilities) and protection of landscapes and views. Does not include rural living (see clause 5.3 of this policy).

Term	Definition
Rural living	An umbrella term used to describe a range of zones that provide for low density residential uses in an estate or precinct, generally characterised by a grouping of lots in the order of one to 40 hectares. Rural living zones include those named rural living, rural retreat, rural residential, special rural, rural smallholdings, rural conservation and landscape protection. Although primary production land uses may occur within some rural living zones, they must be incidental to and compatible with the primary rural living intent and purpose of the zone.
Rural pursuit/hobby farm	As per the *Planning and Development (Local Planning Schemes) Regulations 2015*.
Rural residential zone	A subset of rural living and a land use zone with land parcels from one to four hectares in size and generally provided with scheme water and reticulated power supply. May also be known as special rural.
Rural smallholdings zone	A subset of rural living, except where otherwise identified in a WAPC endorsed strategy or scheme. A land use zone with land parcels from four to 40 hectares in size. May also be known as rural retreat.
Rural strata	The subdivision of rural land into a number of residential strata lots, with the balance of the land being retained for primary production. The balance of the land is generally owned and operated by the owners of the residential lots.
Sensitive land use	Land uses that are residential or institutional in nature, where people live or regularly spend extended periods of time. These include dwellings, short-stay accommodation, schools, hospitals and childcare centres. Generally excludes commercial or industrial premises.
Sensitive zone	An umbrella term that covers land use zones that specifically provide for development of sensitive land uses. These include urban, urban development, residential, rural living and community purpose zones, and proposals for the lifting of urban deferment.
Separation distance	As defined in Government environmental policy, a separation distance is a recommended distance necessary to separate a source of emissions (gaseous and particulate emissions, dust, odour and noise) from sensitive land uses in order to avoid impacts to human health and amenity. A separation distance is an important consideration in determining a buffer.

Term	Definition
Settlement hierarchy	The designation of land for existing or future settlement, with an intended role and/or functional hierarchy.
Significant Geological Supplies	Basic raw materials identified by the Department of Mines and Petroleum as having State significance due to the size of the resource, relative scarcity, demand and/or location near growth areas and transport routes.
Special residential zone	A residential land use zone with land parcels from 2,000m^2 to one hectare in size.
State significance	A land use, area or issue that is considered by the State to be of significance to the State of Western Australia by virtue of any or all of the economic, social, cultural or environmental values for that land use, area or issue.
State strategic industrial areas	Areas zoned or planned for strategic industry, identified by the agency responsible for State Development.
Strategy or scheme	A general term used to capture a range of documents that guide or direct planning decision-making. Specifically, it refers to: • an endorsed regional planning and infrastructure framework • an endorsed sub-regional framework or plan • an endorsed local planning strategy • an endorsed regional planning scheme • an endorsed local planning scheme • any other relevant document endorsed by the Western Australian Planning Commission or Minister for Planning
Tree farm – chip logs	Land used for commercial tree production, generally on a smaller scale, where it is intended that the trees are to be harvested to produce wood chips or wood pulp.
Tree farm – saw logs	Land used for commercial tree production, generally on a smaller scale, where it is intended that the trees are to be harvested to produce higher quality sawn timber or veneers, such as for furniture or the construction industry.
Tree farm – integrated	Tree farm proposals that are small in scale, integrated into existing farming operations, and generally for natural resource management purposes.

Term	Definition
Tree farm – carbon sequestration	Land used for the capture and storage of carbon in a manner that prevents it from being released into the atmosphere. Regulated in Western Australia by the *Carbon Rights Act 2003*.
Urban uses	A general term used to describe the zones and reserves that are typically found in an urban locality or townsite, such as residential, commercial, industrial and public purposes.
WAPC endorsed	A document endorsed, approved or adopted by the Western Australian Planning Commission.
Water resources	Watercourses and wetlands together with their beds and banks; other surface water; and aquifers and groundwater.
Zone	As per the *Planning and Development (Local Planning Schemes) Regulations 2015*. For the purposes of this policy it also includes reserves.

Native vegetation policy

for Western Australia

May 2022

Department of Water and Environmental Regulation

Prime House, 8 Davidson Terrace
Joondalup Western Australia 6027

Telephone +61 8 6364 7000
Facsimile +61 8 6364 7001
National Relay Service 13 36 77

dwer.wa.gov.au

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May 2022

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The Department of Water and Environmental Regulation was established by the Government of Western Australia on 1 July 2017. It is a result of the amalgamation of the Department of Environment Regulation, Department of Water and the Office of the Environmental Protection Authority. This publication may contain references to previous government departments and programs.

Please email the Department of Water and Environmental Regulation to clarify any specific information.

This publication is available on our website or for those with special needs it can be made available in alternative formats such as audio, large print, or Braille.

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Minister's foreword

On behalf of the McGowan Government, I am pleased to release the first native vegetation policy for Western Australia.

Our native vegetation supports our internationally renowned biodiversity and unique flora and fauna, but its importance to Western Australia extends much further than this. It helps address the challenges of climate change by sequestering carbon and sustaining cool and liveable cities. It improves our soils and supports the productivity of agricultural landscapes. It has cultural importance for Aboriginal people and supports important sectors of the State's economy. It is also a key feature of our iconic natural areas which we cherish as Western Australians and which underpin our tourism industry. Western Australia's sustainable future requires that we address the decline of this critical asset.

The management of native vegetation within government is highly decentralised. This policy addresses the longstanding challenge this presents to its protection and enhancement, and aims to achieve increased certainty and confidence for the community and business. Regulation and the conservation estate will always remain vital mechanisms for native vegetation protection – and we will continue to improve and invest in these protections. Yet, enhancing and improving the extent of native vegetation requires action and modern practices across the whole system.

Voluntary restoration, carbon offsets, pricing signals, broadening environmental offsets through revegetation and rehabilitation, and strategic restoration must all be part of the solution. To do this we must engage many stakeholders in coordinated action for maximum impact and effect. This policy provides a framework to do just that.

Other benefits will come from well-considered reforms through implementation. They include:

- fairness and certainty for regulated stakeholders
- robust mapping of native vegetation status and trends to inform decisions and policy-making
- improved transparency
- regional and Aboriginal economic opportunities
- enabling the sustainable economic development and infrastructure Western Australians need to prosper.

The creation of this policy involved extensive consultation, highlighting broad community support. Over the course of its development, the imperative to address the decline in native vegetation has only become clearer. The release of this policy is the start of a coordinated and committed approach to meet this challenge.

Hon Reece Whitby MLA
Minister for Environment; Climate Action

We acknowledge the ***Traditional Owners*** of the land upon which we live and work, and pay our respects to their Elders past and present.

We recognise the intrinsic connection and cultural responsibility to country that Aboriginal people have developed over more than 40,000 years in Western Australia, and the value of this relationship, both for Aboriginal people and for Western Australia's native vegetation.

We seek to understand how changed landscapes and changed access in relation to native vegetation have affected ***Aboriginal people***, and acknowledge the previous and ongoing impacts of colonisation. In implementing this policy, we recognise the traditional practices, expertise, capacity and interest of Aboriginal people in native vegetation. We aim to involve and provide opportunities for Aboriginal people in its management.

In this policy, the terms ***indigenous*** and native refer only to vegetation. We acknowledge that these terms were historically applied to Aboriginal people, and we recognise the historical and ongoing impacts of previous government policy.

Traditional Owners: Aboriginal people who are native title claimants, native title holders or who have otherwise been recognised as having a right and responsibility to speak for country.

Aboriginal people: Aboriginal and Torres Strait Islander people. We acknowledge that many Aboriginal people prefer to be referred to by language group, nation, tribe or clan, with many distinct groups across Western Australia.

Indigenous: That which is naturally existing within a given region as a result of natural processes, with no human intervention. In this policy, indigenous refers only to vegetation.

Policy outcomes

In implementing this policy, the State Government seeks to achieve the following native vegetation outcomes:

Outcome 1
Enable all sectors to contribute to a ***net gain*** and ***landscape-scale*** conservation and restoration.

- ✓ Conserve biodiversity
- ✓ Sequester carbon
- ✓ Build the restoration economy and create jobs

Outcome 2
Business certainty through regulatory clarity, efficiency and coordination.

Outcome 3
Strong, accessible evidence-base for policy-making, decisions and transparency.

See also **Appendix 1: Exploring net gain and landscape-scale conservation** on page 17, which includes definitions of relevant terms and explores how they will be achieved and measured for a given part of the state.

Net gain: For this policy, net gain means that improvements in the extent and/or condition of native vegetation exceed the losses – at *landscape-scale*. It takes into account the sum total of stakeholder actions that influence it, whether these are regulated, voluntary or otherwise. This policy does not introduce net gain as a required outcome at the scale of individual proposals.

Landscape-scale: A scale that permits understanding and management of ecological processes across space, jurisdiction and time, with a focus on ecological corridors, resilience, connectivity and global change (including climate change).

Policy purpose

This policy guides State Government agencies to work together and with stakeholders, applying and adjusting their policies and practices to achieve the policy outcomes.

This means setting up:

1. the right ***policy settings*** – both statewide and through regional planning for native vegetation
2. the right practices – for consistency, transparency, and to collate decision data
3. the right information and systems – for accessible data to support informed decisions by all.

Policy settings: A coordinated suite of policy instruments and policy positions which together aim to achieve desired outcomes; for example, a mix of regulation, funding and economic incentives, services or information, and how they work together to guide stakeholder choices.

Policy scope

This policy applies to Western Australian State Government ***agencies***, focusing on areas of responsibility that influence and interact with native vegetation (see Table 1, page 11). Primarily it applies through the policy-making, regulatory, land management, land planning and funding roles of agencies. They may choose to refer to the policy in their advice, including to independent boards and committees.

This policy sets strategic direction for agencies, with a long-term view.

It will be implemented:

1. broadly, through agencies choosing to consider their current policies and practices and making changes in line with the direction set by this policy
2 specifically, through agencies leading and/or supporting the tangible actions in the implementation roadmap over the next four years (see **How agencies will implement this policy** on page 14).

Agency: A department or SES organisation as defined in the *Public Sector Management Act 1994*.

See also **Appendix 2: Exploring this policy's scope** on page 18, which describes how this policy will influence all sectors, how it relates to regulation, and where it fits within legislation and policy hierarchies.

What agencies will do

To protect and enhance native vegetation now and for the future, agencies will make coordinated, deliberate, well-informed and transparent decisions – whether to protect it, restore it or to accept impacts to it in favour of other priorities.

In developing and implementing their policies, plans, programs, projects, processes and systems, agencies will identify and progress reforms to:

1. consider and transparently account for the values of native vegetation in decision-making that affects it, based on the best information available at the time
2. apply the ***mitigation hierarchy*** steps to any planned impacts on native vegetation at both strategic and project scale – avoid, minimise, then rehabilitate – before considering offsets
3. improve the spatial capture of their regulatory, land management, land planning and funding decisions that affect native vegetation, applying common data standards to facilitate data sharing
4. work together with other agencies and stakeholders to expand and apply the native vegetation knowledge base, improve mapping and monitoring of its status and values, and broaden the availability of spatial data.

Agencies will collaborate to design and apply whole-of-government policy settings which:

5. achieve conservation and restoration of native vegetation while also delivering other state priorities like regional prosperity, Aboriginal wellbeing and a strong economy
6. maximise the ***co-benefits*** of sustainable native vegetation management, for ecological, community and economic outcomes
7. inspire and support all sectors to conserve and restore native vegetation, complementing the state's conservation estate and regulatory functions
8. support coordinated, outcome- and risk-based decision-making across all of the State Government's regulatory, land management, land planning and funding functions that affect native vegetation, including through approaches which:
    a. are tailored to bioregional differences or specific challenges
    b. include targets and thresholds where they are warranted and achievable
    c. leverage environmental offsets and other funding streams to address impacts at a landscape scale.

Mitigation hierarchy: Steps that must be taken to limit impacts on native vegetation – avoid, minimise, rehabilitate – before considering offsets. See also the *WA Environmental Offsets Policy and Guidelines*.

Co-benefits: Added benefits from managing native vegetation (e.g. urban cooling, carbon sequestration, erosion control).

Why we need a policy on native vegetation

We acknowledge

Western Australia's native vegetation is internationally renowned for its biodiversity and gives character to the state's unique and iconic landscapes. It is intrinsically valuable, provides habitat for native animals, binds carbon, supports soil health, cleanses water, prevents erosion, controls salinity, provides oxygen, cools cities and towns, feeds livestock and provides timber and ***bush products***. It is culturally and spiritually significant to Aboriginal people, underpins community health and wellbeing, and supports important sectors of the state's economy.

Bush products: Includes industries derived from Australian native plants, botanicals-based products and foods from native plants (e.g. honey).

As Western Australia's population and economy grows, pressures on our native vegetation continue. Since European settlement, the loss and degradation of Western Australia's native vegetation has been ongoing. The South West is one of 36 global biodiversity hotspots – recognising it is already more than 70 per cent cleared, subject to multiple urgent threats, and supports thousands of endemic and irreplaceable species. Clearing has also caused costly problems like salinity, erosion and intensifying urban temperatures. In some areas, what remains is rare, significant and fragmented, and under threat from climate change, bushfires and invasive species. Cumulative impacts are leading to increasingly protracted regulatory assessments. If they continue unchecked, they will work against Western Australia's Climate Policy and our progress towards net zero carbon emissions by 2050.

To reverse the decline in native vegetation, we need effective coordination and a systematic approach. There are many organisations and individuals involved in conserving, restoring, utilising and clearing native vegetation, for many purposes. They are subject to various legislative and other frameworks at international, national, state, regional and local levels (see Table 1 and Figure 3). Adding to this complexity, Western Australia has a great diversity of vegetation types. Around the state, the historic impacts and the main threats, land uses and tenures all vary. So do the regulatory and other decision-making pathways, and the solutions to address native vegetation decline.

We need a way to untangle the complexities, plan ahead and work together across the public, private and community sectors. With the right strategies, we can achieve ecologically sustainable management of native vegetation together with other state priorities, such as economic and regional development, community safety and traditional practices.

Strategic, regional planning for native vegetation is a solution that can deliver the consistency, transparency and clarity stakeholders seek, yet there are various policy-making models to consider. The models span all three tiers of government, with various purposes, scopes and regional boundaries. Choosing the right model for a given part of the state will need careful analysis of the problems to solve, their geographic extent and the main decision-making pathways. We will do this work, together with stakeholders, in implementing this policy (see **More on regional planning for native vegetation** on page 11).

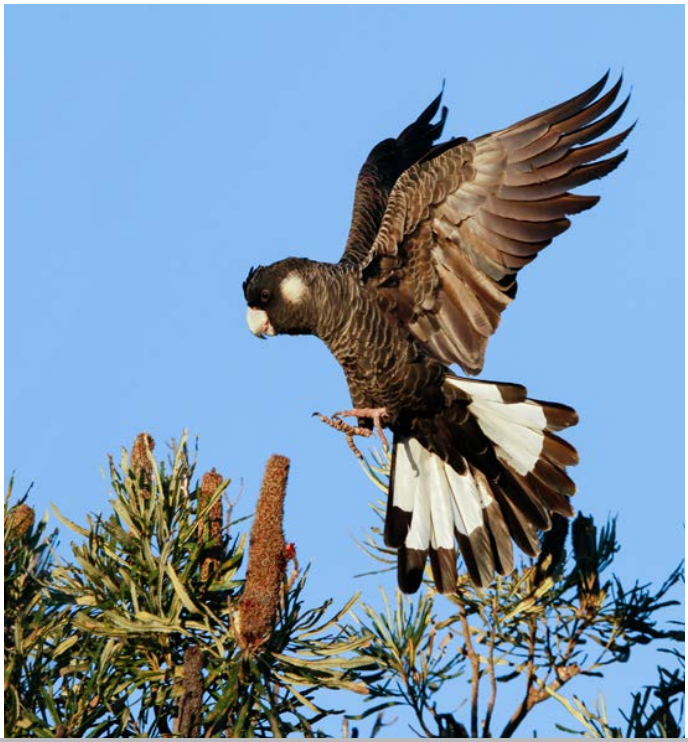


Photo: K. Lightbody

International obligations

- UN Convention on Biological Diversity
- UN Convention to Combat Desertification
- Convention on Migratory Species
- World Heritage Convention
- Ramsar Convention on Wetlands
- Sustainable Development Goals
- UN Framework Convention on Climate Change

National frameworks and strategies

- Australia's Strategy for Nature
- Australia's Native Vegetation Framework
- Threatened Species Strategy
- Australian Pest Animal Strategy
- Australian Weeds Strategy
- Australia's Strategy for the National Reserve System

Areas of government responsibility

- Aboriginal affairs and engagement
- Aboriginal heritage and heritage regulation
- Agriculture
- Biodiversity and conservation reserve planning and management
- Climate action
- Emergency services planning
- Environmental regulation
- Forestry planning and management
- Mining and petroleum regulation
- Natural resource management funding
- Pastoral lands management
- Regional and state development
- Road safety
- Transport planning and delivery
- Tourism
- Urban and land use planning
- Water regulation, planning and management

Table 1. The context for managing native vegetation is complex. There are many international and national considerations, and it interacts with many areas of government responsibility.

▶ More on regional planning for native vegetation

Some benefits

Regional planning for native vegetation will provide clear regionally tailored objectives, supporting accountability, business certainty, and guiding individual decisions so they count towards strategic goals.

It can help address cumulative impacts, offsets and competing priorities in a transparent way. This may help reduce complexities when assessing individual proposals.

It can provide strategic solutions for environmental offsets, enabling the best long-term environmental benefit from existing and emerging funding streams such as environmental grants, carbon markets and environmental offsets.

Types of outputs

Regional planning for native vegetation will produce outputs such as policy documents that outline clear objectives and priorities (including targets and thresholds where warranted), maps or corridor concepts, strategic restoration plans, strategic offsets plans or schemes.

Potential policy-making models

Some models can apply broadly, like strategic advice or assessments under state and federal environmental legislation. Some only apply to one type of decision-making pathway, such as the various models under the State Planning Framework. Other models guide investment, like conservation reserve planning or the State Natural Resource Management Framework. Regional planning is also possible under federal environmental legislation.

We recognise

In developing this policy, the State Government recognises values, practice and opportunities and challenges.

Values

1. Native vegetation is vital for all life on earth and is intrinsically valuable. Some ecosystems are irreplaceable. All Western Australians depend in some way on the ***ecosystem services*** and co-benefits that native vegetation provides.
2. Western Australia's unique flora and iconic ecosystems are nationally and globally significant for biodiversity conservation.
3. Native vegetation is of cultural value to Aboriginal people, who have a long history of sustainable management and use of native vegetation.
4. Native vegetation sustains community health and wellbeing and provides a unique sense of place.
5. Native vegetation is of economic value. It sustains important sectors of the economy and provides valuable ecosystem services that are costly to replace.

Ecosystem services: The benefits people derive from ecosystems, including provisioning (e.g. food, fibre, fuel), regulating (e.g. erosion control, water filtration), supporting (e.g. biodiversity conservation) and cultural services (e.g. sense of place, nature-based or cultural tourism).

Practice

6. Conservation of biological diversity and ecological integrity should be fundamental considerations in protecting and managing native vegetation.
7. A comprehensive, adequate and representative (CAR) reserve system is an important mechanism for conserving native vegetation, species and communities.
8. Stewardship of native vegetation by all land managers is vital to ensure landscape health – including through its integration with other productive land uses (e.g. agriculture, mining), or through its ecologically sustainable use (e.g. beekeeping, pastoralism, forestry).
9. Maintaining the ecosystem services and co-benefits of native vegetation is an intergenerational responsibility and shared across all sectors and levels of government. The health, diversity and productivity of native vegetation must be maintained or enhanced for the benefit of current and future generations.
10. Decision-making for vegetation must be underpinned by sound science; reliable information on its ecological, social, cultural and economic values; and understanding of cumulative impacts. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

Opportunities and challenges

11. Western Australia's native vegetation is in decline and biodiversity loss is escalating. Reversing the decline requires coordinated management across all land tenures to improve the extent, condition, connectivity and resilience of native vegetation to maintain ecosystem function.
12. A net gain in native vegetation will store carbon and contribute to net zero carbon emissions by 2050. We must support native vegetation's resilience to climate change and its impacts on water, fire and temperature regimes.
13. Traditional Owners, with their rich cultural knowledge of ecosystems, have important roles in co-managing, conserving and restoring native vegetation, and in planning for its management.
14. Ecologically sustainable development is essential to the wellbeing and prosperity of Western Australians, and requires integrating environmental, economic and social considerations in decision-making.
15. In the intensive land use zone, in particular the ***Swan Coastal Plain*** and the ***Wheatbelt*** (see Figure 1), historic clearing has been extensive. Strategic coordination and stewardship across sectors is needed to restore landscape and ecosystem function.
16. In the extensive land use zone (see Figure 1), native vegetation is subject to a range of degrading processes. Coordinated management of the threats to native vegetation is needed to maintain and enhance its condition and ecosystem function.

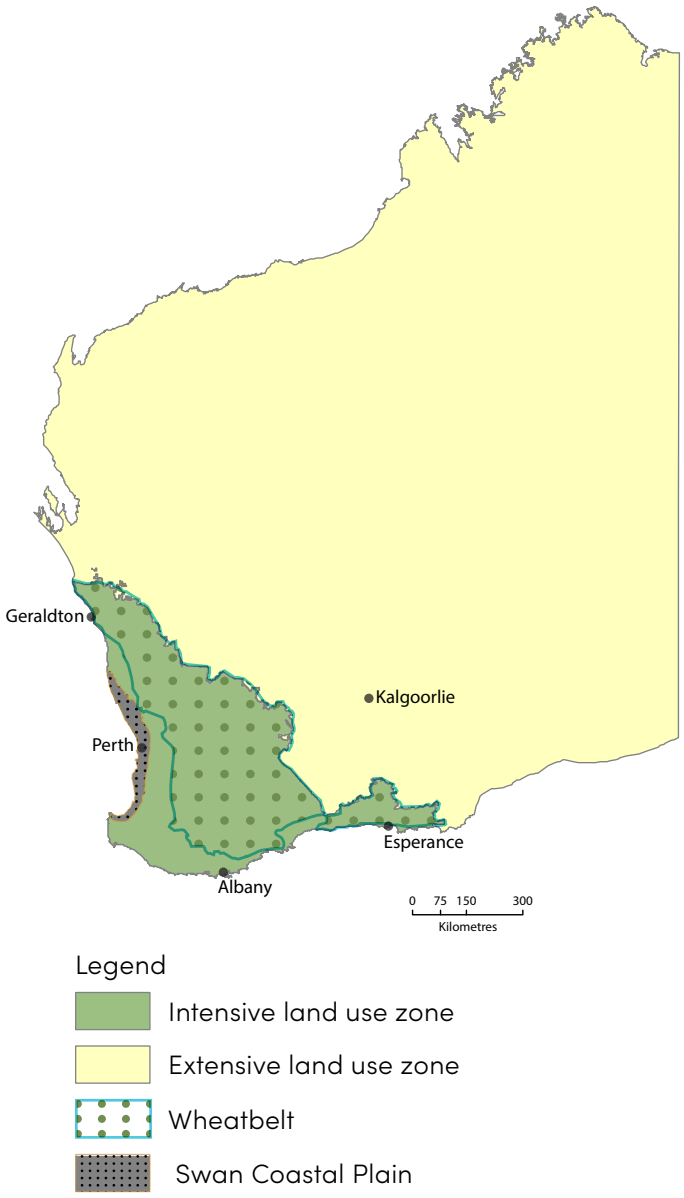


Figure 1. Intensive and extensive land use zones, Swan Coastal Plain and Wheatbelt (see Glossary)

Swan Coastal Plain **(SCP)**: For this policy, the SCP means the Perth subregion (SWA02) of the SCP bioregion in the Interim Biogeographic Regionalisation for Australia, version 7. Note: The Dandaragan Plateau subregion (SWA01) of the SCP bioregion (SWA01) comes under this policy's definition of the Wheatbelt.

Wheatbelt: For this policy, the Wheatbelt coincides with the area of broadacre farming in the Generalised Land Use of Western Australia map (Department of Agriculture and Food WA, 2017).

How agencies will implement the policy

Policy strategies

Agencies will implement the policy through actions under the following strategies (see Figure 2).

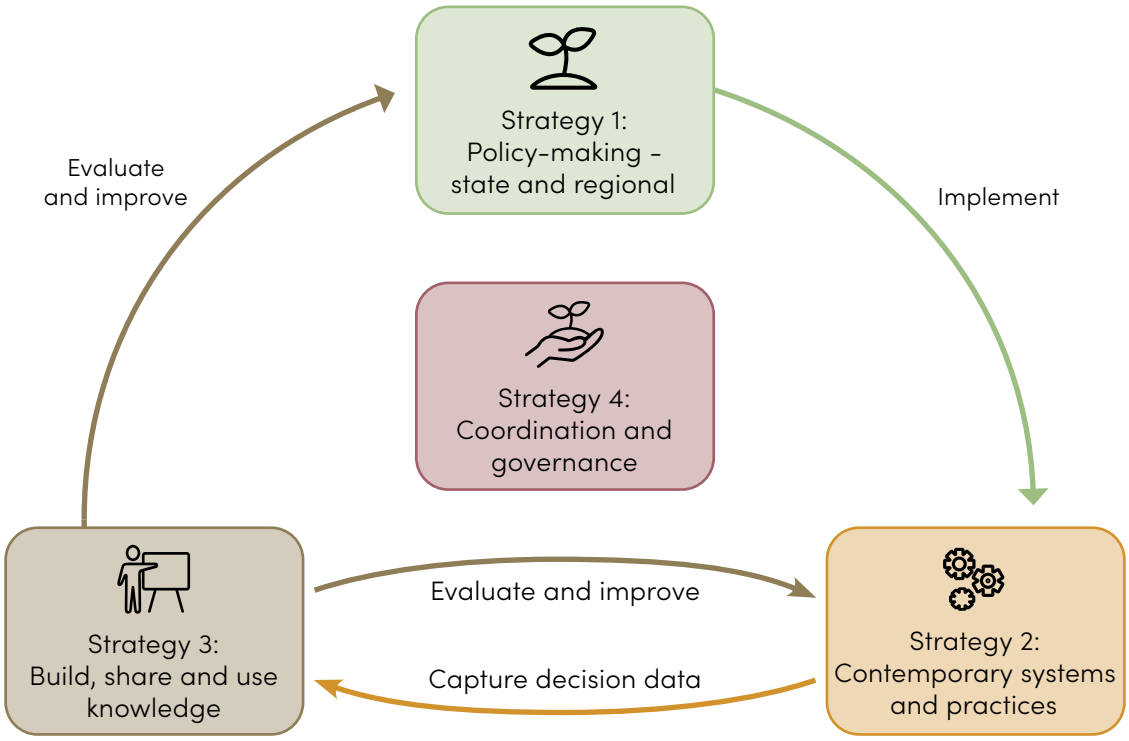


Figure 2. The policy strategies provide for evaluation and improvement, supporting a contemporary policy evaluation cycle

Implementation roadmap

The *Implementation roadmap* sets out the tangible actions that the State Government will take over the next four years to achieve the policy outcomes.

Monitoring and reporting on progress

The lead agency for policy implementation is identified in the *Implementation roadmap* and will report annually on the roadmap's progress and outcomes. To support the lead agency's public reporting, agencies will report on their progress against roadmap actions via a committee of agencies' Directors General.

In scoping and reporting on each roadmap action, agencies will articulate the action's success measures, reflecting on how the action contributes to one or more of the policy outcomes[1].

1 For example, some roadmap actions will develop the data, systems and practices to assess our progress towards net gain and landscape-scale conservation. Other actions may improve stakeholder experience around transparency or certainty, which may be assessed through existing reference groups, regulatory statistics or stakeholder surveys.

Guidance for roadmap agencies

Along with the broad strategic direction that this policy provides, all agencies with roadmap responsibilities should be guided by the following considerations when designing and delivering the actions.

1. In relevant roadmap actions, explore how a net gain in both condition and extent might be defined, measured (including baseline and timeframes) and achieved in the context of the roadmap action.

   Either adopt the definition to guide the action, or articulate why it is not appropriate to adopt (e.g. in the context of other state priorities) and adopt an alternative (e.g. improve condition and connectivity of remnant vegetation).

   See also **Appendix 1 Exploring net gain and landscape-scale conservation and restoration** (page 17).

2. Align with the Aboriginal Empowerment Strategy and the National Agreement on Closing the Gap in the way the action is achieved and in its outcomes, including appropriate co-design and consultation.
3. Enable stakeholders to contribute innovative solutions which contribute to the policy outcomes.

   For example: local and Aboriginal-led solutions for managing native vegetation that also deliver economic, social and cultural benefits, such as jobs in cities and regional areas.

4. Consider all the ***policy instruments*** available for complementing effective regulation with other measures to achieve the policy outcomes.

   For example: coordinating and promoting existing incentives that support voluntary conservation and restoration on various land tenures; or building public awareness of how native vegetation and its ecosystem services sustain community health and wellbeing.

Policy instrument: Tools used by governments to pursue a desired outcome, such as regulation, funding and economic incentives, or providing services or information.

Regional planning for native vegetation

5. In collaboration and informed by analysis and consultation, determine which regional planning model to use (see **More on regional planning for native vegetation** on page 11) and whether a strategic offsets plan is required, in line with the regional planning steps outlined in the *Implementation roadmap*.
6. Develop clear, regionally tailored objectives and priorities to promote strategic coordination across State Government functions. Once implemented consistently, these should:
   a. support business certainty and fairness and regulatory efficiency; and enable outcome-based decisions and risk-based streamlining
   b. clarify environmental standards, supporting transparency and accountability
   c. coordinate efforts and investment by the public, private and community sectors, helping every decision to count towards common strategic goals.
7. Consider the following in developing regionally tailored objectives and priorities:
   a. native vegetation values (environmental, social, cultural and economic), informed by sound science, traditional and local knowledge
   b. cumulative impacts, competing priorities and consideration of how targets and thresholds could support achievement of the objectives
   c. managing threats to improve the condition and resilience of remnant vegetation (e.g. climate change, invasive species, inappropriate fire regimes, inappropriate water regimes and quality, unsustainable use)
   d. opportunities to complement the conservation reserve system and its management, including by identifying land with strategic value for restoration or conservation
   e. ecosystem services and their co-benefits (e.g. habitat protection, soil health, carbon sequestration, flood mitigation, salinity and erosion mitigation, water provision, temperature control, human health, sustainable grazing, timber and bush products).

Appendix 1: Exploring net gain and landscape-scale conservation and restoration

This policy guides agencies to use a range of policy instruments (see definition page 15) in complementary ways, encouraging stakeholders to ***conserve*** and ***restore***. Net gain is to apply at landscape scale (see definition page 7), taking into account the sum total of stakeholder actions that influence it – regulated, voluntary and otherwise.

Acknowledging the many challenges in net gain definitions and accounting, this policy guides agencies to explore how to define, measure and achieve net gain at landscape scale, through the policy's roadmap actions (see **Guidance for roadmap agencies**, point 1 on page 15).

Conserve: Protect native vegetation from harm, loss or change.

Restore: Supporting the recovery of an ecosystem that has been degraded, damaged or destroyed. Includes revegetation, rehabilitation, repair of ecosystem processes and management of threats.

Benefits of net gain

Aiming for a net gain will conserve biodiversity, sequester carbon and build market demand for ecosystem restoration services, resulting in new economic and employment opportunities.

It will also support the many other ecosystem services that native vegetation provides.

Benefits of landscape-scale conservation and restoration

Regional planning for native vegetation will set the scene for landscape-scale conservation and restoration. It will guide decisions and investment at the property or local scale to contribute to a landscape-scale plan to support connectivity and resilience, so that the environmental benefits are greater than the sum of their individual parts.

Appendix 2: Exploring this policy's scope

How this policy will influence all sectors

Agencies' policies and practices influence the decisions and actions of many stakeholders which conserve, restore and clear native vegetation. Through using its policies and practices in complementary ways, the State Government can influence stakeholder choices and the resulting outcomes (see Figure 3).

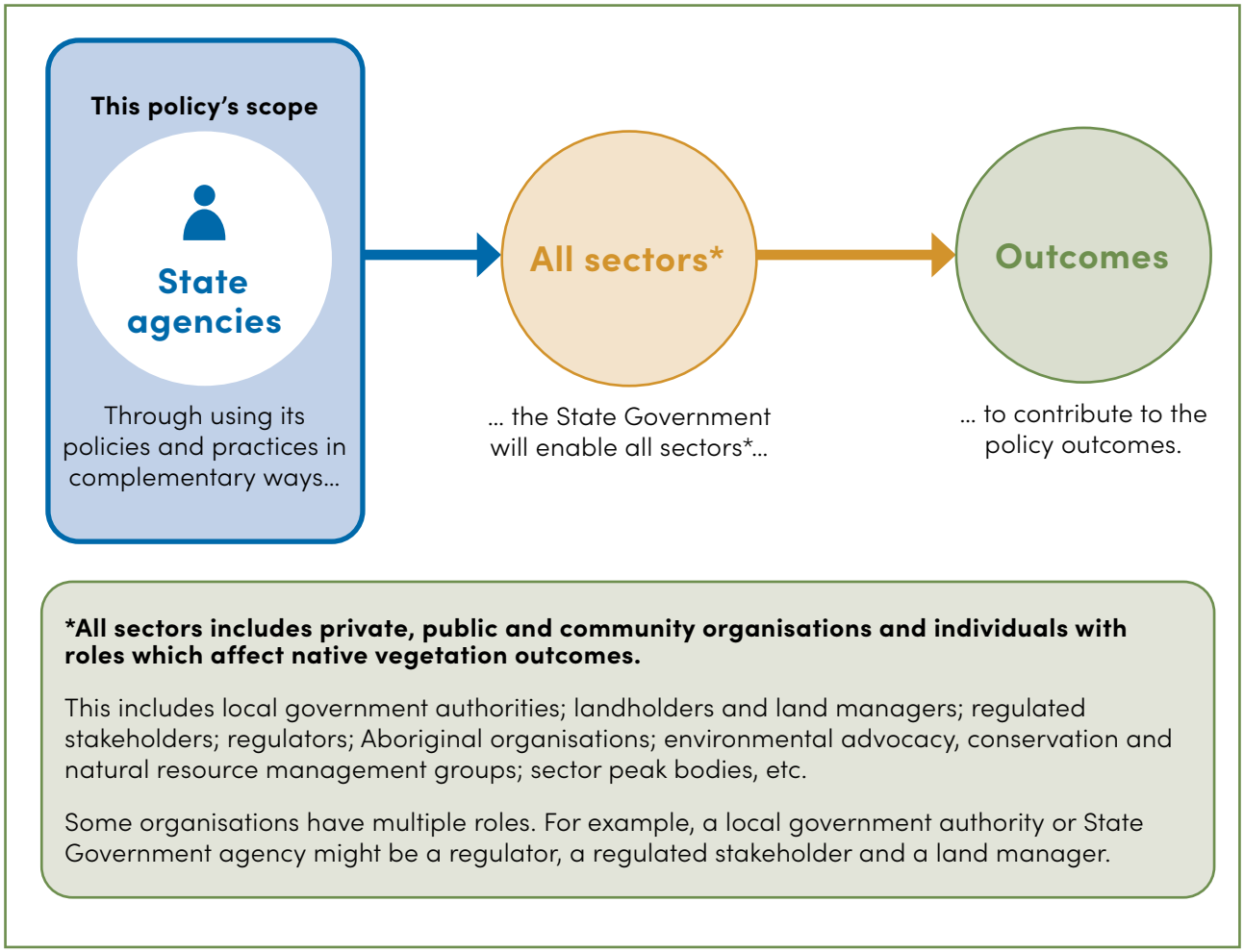


Figure 3. How this policy will influence all sectors

A whole-of-government policy

This is a whole-of-government policy. It does not sit under any one piece of legislation or a policy hierarchy. Rather, it guides coordinated use of statutory and non-statutory functions under various pieces of legislation.

This policy recognises that we must complement regulatory controls with a range of other measures if we are to achieve a net gain in native vegetation.

Literature on ***system stewardship*** as a model for public policy may provide more clarity on the policy's position within the legislation and policy hierarchy.

System stewardship: Creating the right conditions to steer complex systems towards desired outcomes, rather than relying solely on imposing top-down decisions.

How this policy relates to regulation

As a result of some roadmap actions – particularly those for regional planning for native vegetation – regulatory standards may become clearer or change. In line with the usual processes, the State Government will fully consult with regulated stakeholders on any relevant changes.

This policy's definition of ***native vegetation*** is broader than the state's regulatory definition of it, because it guides better coordination of actions, regulated, voluntary or otherwise.

Native vegetation: For this policy, native vegetation means vegetation that comprises terrestrial or aquatic plants within their natural distribution, including living and non-living components, and voluntarily-restored native vegetation.

Department of Water and Environmental Regulation

8 Davidson Terrace
JOONDALUP WA 6027

Locked Bag 10
Joondalup DC
JOONDALUP WA 6919

Phone: +61 8 6364 7000
Fax: +61 8 6364 7001

For further information

Telephone: (08) 6364 7000
Email: nvs@dwer.wa.gov.au

SHIRE OF HARVEY

A Breath of Fresh Air

FILE NO: A2575/EX/003
DOC NO: 20/12768
APPLIC NO: P52/20

10 September 2020

B & J CATALANO PTY LTD
SOUTH WESTERN HIGHWAY
BRUNSWICK JUNCTION WA 6224

Att: Peter Bennett

Dear Peter,

Proposed Sand Extraction - Lot 7 Runnymede Road, Wellesley

I refer to your Application for Development Approval dated 02/04/2020 for the proposed Sand Extraction at the above property address. Please be advised that Staff, under delegated authority (Delegation No. 4.1.27(2)) have approved the application subject to the attached conditions. This application has been granted Development Approval only, and where necessary a Building Permit will need to be obtained from Council prior to the commencement of works.

Pursuant to Clause 77 of Schedule 2 (Deemed provisions for local planning schemes) of the *Planning and Development (Local Planning Scheme) Regulations 2015*, the applicant / owner is able to seek Council's approval to amend or cancel the development approval.

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. Further information and review application forms can be obtained by contacting the State Administrative Tribunal on 08 9219 3111 or via their website www.sat.justice.wa.gov.au.

Should you have any queries or require additional information please do not hesitate to contact Neville Dowling, Planning Officer on 9729 0312 or via email nevilled@harvey.wa.gov.au

Kind Regards,

Elizabeth Edwards
Manager Planning Services

Planning and Development Act 2005

SHIRE OF HARVEY
District Planning Scheme No. 1

Notice of determination on application for development approval

Location: 0 RUNNYMEDE ROAD WELLESLEY 6233

Lot:	7	Plan/Diagram:	D040591
Vol. No:	1358	Folio No:	260
Application date:	09/03/2020	Received on:	02/04/2020

Description of proposed development: SAND EXTRACTION

The application for development approval is:

☒ Approved subject to the following conditions:

1. No extraction works associated with this Development Approval are permitted to occur on the property until such time as Conditions 3 to 8 of this Development Approval have been satisfactorily achieved and an Extractive Industry Licence has been issued by the Shire.

2. This approval is valid for a period of five (5) years from the date of the issue of the Extractive Industry Licence. If development is not substantially commenced within this period, a new approval must be obtained before commencing or continuing development.

<u>Prior to the Issue of an Extractive Industry Licence</u>

3. A copy of an amended groundwater Licence is to be provided to the Shire to confirm sufficient water supply for dust suppression.

4. Prior to the issue of an Extractive Industry Licence, the Applicant shall submit for approval by the Shire a *Phytophthora* Dieback Information Brochure. The *Phytophthora* Dieback Information Brochure shall include the 'best practice management techniques' utilised by the operator for Lot 7.

5. Prior to the issue of an Extractive Industry Licence, a reinstatement bond of $9,850 (1.97ha @ $5,000 per hectare) shall be provided to the Shire in the form of a Bond or an irrevocable and unconditional Bank Guarantee.

6. Prior to the issue of an Extractive Industry Licence, the Applicant shall have the approved pit boundaries surveyed and fenced by a suitably qualified surveyor, with the location of such pegs being to the satisfaction of the Shire.

7. Prior to the issue of an Extractive Industry Licence, a suitable demarcation barrier shall be erected 15m from the outer edge of the canopies of the trees, to the satisfaction of the Shire.

8. Prior to the issue of an Extractive Industry Licence, the Applicant shall prepare and submit for approval by the Shire, a Dieback Management Plan.

Ongoing

9. The Approved Development shall, at all times, comply with the approved plans and/or approved Management Plans and Environmental Management Plan (A002575/EX/003 - 01), as modified by the conditions of this approval.

10. Excavation shall be undertaken to ensure a 0.5m separation distance to the Maximum Seasonal Groundwater Level, unless otherwise approved by the Shire in consultation with the Department of Water and Environmental Regulation, is maintained for the life of the extraction activities.

11. An annual contribution shall be made towards the maintenance and upgrading of Runnymede and Wellesley Road in accordance with the methodology adopted by WALGA in the document "Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks, May 2015".

12. Any proposed clearing of native vegetation is prohibited unless done under a clearing permit issued in accordance with the Environmental Protection Act 1986, or the clearing is exempt from the need for a clearing permit.

13. The Applicant shall engage a suitably qualified independent expert to carry out an Annual Audit of Compliance of the conditions of Development Approval and Extractive Industry Licence. The Annual Audit of Compliance shall also include a progress report on the conditions of the approved Rehabilitation Management and Monitoring Plan including:

    a. Details of completed, ongoing and future rehabilitation areas;

    b. Photos of rehabilitated areas;

    c. Monitoring and reporting details, if available;

    d. Start and completion dates, and expected start dates, if applicable; and

    e. A map depicting the rehabilitation areas and their completion progress.

    The Annual Audit of Compliance shall be submitted prior to an annual renewal licence being issued by the Shire.

14. No screening activities shall occur unless a Works Approval has been obtained from the Department of Water and Environmental Regulation as required by Part V of the Environmental Protection Act 1986.

15. Stockpiles shall be kept to a maximum height of 5m to avoid visual impact and/or material wind drift.

16. Operating hours are restricted to 7.00a.m. – 5.00p.m., Monday to Friday and 7.00a.m. – 12.00 noon on Saturday. No activities to occur on Sunday or Public Holidays.

17. The Applicant is required to provide a copy of the endorsed Phytophthora Dieback Information Brochure:

a. To each new customer of the extractive industry operation; and

b. Once to each existing customer of the extractive industry operation as an updated version.

18. The approved Rehabilitation Management and Monitoring Plan (Doc.No. A002575/EX/003 – MP1) shall be implemented to the satisfaction of the Shire.

19. The approved Weed Management Plan (Doc.No. A002575/EX/003 – MP2) shall be implemented to the satisfaction of the Shire in consultation with the Department of Primary Industries and Regional Development.

20. The approved Water Management Plan (Doc.No. A002575/EX/003 – MP3) shall be implemented to the satisfaction of the Shire in consultation with the Department of Water and Environmental Regulation.

21. The approved Dust Management Plan (Doc. No. A002575/EX/003 – MP4) shall be implemented to the satisfaction of the Shire.

22. The approved Dieback Management and Monitoring Plan (Doc.No. A002575/EX/003 – MP5) shall be implemented to the satisfaction of the Shire.

23. The pit boundary survey pegs shall remain in place for the duration of the operation to the satisfaction of the Shire.

24. With respect to the reinstatement bond required by condition 5), the Shire:

    a. may call on the Bank Guarantee or Bond for the purpose of carrying out or maintaining rehabilitation work required by the Rehabilitation Management and Monitoring Plan, where that work has not been satisfactorily carried out by the Applicant;

    b. may, with one week's written notice to the Applicant, enter Lot 7 for the purpose of carrying out or maintaining the rehabilitation work;

    c. may retain the Bank Guarantee or Bond and/or enter Lot 7 in accordance with the preceding paragraph for three years after the expiration of this approval, or until the works prescribed by the Rehabilitation Management and Monitoring Plan have been satisfactorily completed (whichever is the later); and

    d. must return the Bank Guarantee or Bond (or the balance thereof) to the Applicant at the expiration of that period.

25. Groundwater shall not be extracted or dewatered during the operation of the extraction activities.

26. Any refuelling activities must be undertaken in accordance with the Department of Water and Environmental Regulations' Water Quality Protection Note - Toxic and Hazardous Substance Storage and Use. There is to be no storage of hydrocarbons on-site and no major vehicle or machinery repairs or maintenance is to take place on-site.

Advice Notes

a. The Applicant is advised of their obligations under the Environment Protection and Biodiversity Conservation Act 1999;

b. The Department of Planning, Lands and Heritage recommends that reference be made to the State's Aboriginal Heritage Due Diligence Guideline.

c. All extraction is required to remain compliant with the Shire of Harvey Extractive Industry Local Law 2017, including the holding of a valid licence for all periods of operation.

d. The Applicant is advised of the requirements of Water Quality Protection Note 15 'Basic raw materials extraction, DWER, July 2019'.

Date of determination: 10 September 2020

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.

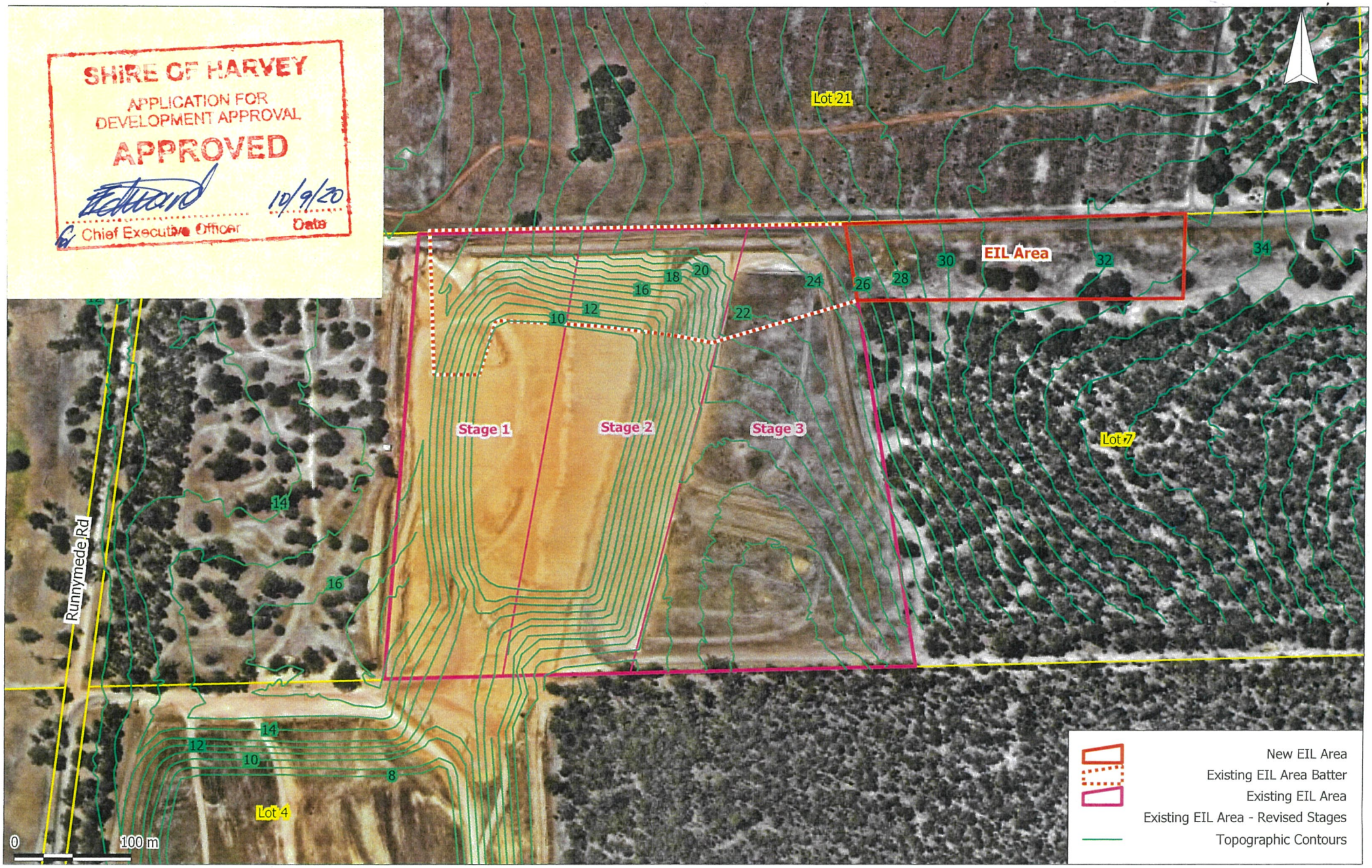
Note 2: Where an approval has so lapsed, no development must be carried out without the further approval of the local government having first been sought and obtained.

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.

Signed: .....

for and on behalf of the Shire of Harvey

Dated: 10 September 2020



Lundstrom Environmental Consultants Pty Ltd Leeming WA 6149 Mob: 0417934863, mikelund1@bigpond.com	Scale: 1:4100 Original Size: A4 Air Photo Source: Nearmap Dec 2019 Datum: GDA94 Projection: Australia MGA94 (50)	Client: B & J Catalano Project: Sand Extraction Location: Lot 7 Runnymede Rd, Wellesley	**Figure 3:** **Extractive Operations**

\\lecserver\DATA\Catalano\Runnymede Rd Lots 4 & 7_Wellesley_SoH_Sand\Lot 7 Runnymede Rd\2020 Application\Drawings\F3 Lot 7 extraction area latest.map 11/02/2020

SHIRE OF HARVEY

A Breath of Fresh Air

FILE NO: A002628/EX/005
DOC NO: 22/01239
APPLIC NO: P17/22

17 March 2022

B & J CATALANO PTY LTD
SOUTH WESTERN HIGHWAY
BRUNSWICK JUNCTION WA 6224

Dear Sir/Madam,

Proposed Renewal of Extractive Industry (Including Amendment to P50/17) - Lot 4 Runnymede Road Wellesley 6233

I refer to your Application for Development Approval dated 19/01/2022 for the proposed Renewal of Extractive Industry (Including Amendment to P50/17) at the above property address. Please be advised that Staff, under delegated authority (Delegation No. 9.1.2(13), 9.1.6) have approved the application subject to the attached conditions. This application has been granted Development Approval only, and where necessary a Building Permit will need to be obtained from Council prior to the commencement of works.

Pursuant to Clause 77 of Schedule 2 (Deemed provisions for local planning schemes) of the *Planning and Development (Local Planning Scheme) Regulations 2015*, the applicant / owner is able to seek Council's approval to amend or cancel the development approval.

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. Further information and review application forms can be obtained by contacting the State Administrative Tribunal on 08 9219 3111 or via their website www.sat.justice.wa.gov.au.

Should you have any queries or require additional information please do not hesitate to contact me on 9729 0348 or via email elizabethe@harvey.wa.gov.au.

Kind Regards,

Elizabeth Edwards
Manager Planning Services

Planning and Development Act 2005

SHIRE OF HARVEY
District Planning Scheme No. 1

Notice of determination on application for development approval

Location: 0 RUNNYMEDE ROAD WELLESLEY 6233

Lot:	4	Plan/Diagram:	/P005888
Vol. No:	1942	Folio No:	426
Application date:	19/01/2022	Received on:	19/01/2022

Description of proposed development: RENEWAL OF EXTRACTIVE INDUSTRY (INCLUDING AMENDMENT TO P50/17)

The application for development approval is:

☒ Approved subject to the following conditions:

1. All extraction activities, processing and storage of extracted or processed materials must cease on or before five (5) years from the date of the issue of the Extractive Industry Licence. If further extraction activities, processing or storage of extracted or processed materials is required after five (5) years from the date of the issue of the Extractive Industry Licence, a new approval must be obtained before continuing.

2. The Approved Development shall, at all times, comply with the approved plans, previously approved Management Plans and the previously approved Works and Excavation Plan (dated April 2017), as modified by conditions of this approval.

3. Excavation shall be undertaken to a maximum depth of 8.0mAHD, unless otherwise approved by the Shire, in consultation with the Department of Water and Environmental Regulation, following site specific groundwater monitoring being undertaken.

4. Groundwater shall not be exposed, extracted or dewatered during the operation of the extraction activities unless the appropriate approval has been obtained from the Department of Water and Environmental Regulation.

5. If groundwater is exposed or intercepted, activities on site shall cease immediately and the Shire shall be notified within 24 hours. Such exposure or interception of the groundwater shall be remedied to the satisfaction of the Shire in consultation with the Department of Water and Environmental Regulation.

6. Stockpiles shall be kept to a maximum height of 5m to avoid visual impact and/or material wind drift.

7. Operating hours are restricted to 6.00a.m. – 6.00p.m., Monday to Friday and 7.00a.m. – 12.00 noon on Saturday. No activities to occur on Sunday or Public Holidays.

8. The pit boundary survey pegs shall remain in place for the duration of the operation to the satisfaction of the Shire.

9. No crushing or screening activities shall occur unless a Works Approval or other appropriate Licence or Registration has been obtained from the Department of Water and Environmental Regulation as required by Part V of the *Environmental Protection Act 1986*.

10. An annual contribution shall be made towards the maintenance and upgrading of Runnymede Road and Wellesley Road in accordance with the methodology adopted by WALGA in the document "Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks, May 2015".

11. The Applicant and/or operator shall engage a suitably qualified independent expert to carry out an Annual Audit of Compliance of the conditions of Development Approval and Extractive Industry Licence. The Annual Audit of Compliance shall also include a progress report on the conditions of the approved Rehabilitation Management and Monitoring Plan including:

    a. Details of completed, ongoing and future rehabilitation areas;

    b. Photos of rehabilitated areas;

    c. Start and completion dates, and expected start dates, if applicable; and

    d. A map depicting the rehabilitation areas and their completion progress.

    The Annual Audit of Compliance shall be submitted prior to an annual renewal licence being issued by the Shire.

12. A survey plan shall be provided annually with the Annual Audit of Compliance required by Condition No. 11 detailing the levels in mAHD of the active and non-rehabilitated extraction areas.

13. The Applicant is required to provide a copy of the endorsed *Phytophthora* Dieback and Extractive Industries Information Brochure to each new customer of the extractive industry operation.

14. The approved Rehabilitation Management and Monitoring Plan (dated 2017) shall be implemented to the satisfaction of the Shire.

15. The approved Water Management Plan (dated 2017) shall be implemented to the satisfaction of the Shire to ensure all stormwater is retained and managed onsite.

16. The approved Weed Management Plan (dated 2017) shall be implemented to the satisfaction of the Shire in consultation with the Department of Primary Industries and Regional Development.

17. The approved Dieback Management and Monitoring Plan (dated 2017) shall be implemented to the satisfaction of the Shire.

18. The approved Noise Management and Monitoring Plan (dated 2017) shall be implemented to the satisfaction of the Shire.

19. The approved Dust Management Plan (dated 2017) shall be implemented to the satisfaction of the Shire.

20. With respect to the reinstatement bond of $70,300 held by the Shire, the Shire:

    a. may call on the Bank Guarantee or Bond for the purpose of carrying out or maintaining rehabilitation work required by the Rehabilitation Management and Monitoring Plan, where that work has not been satisfactorily carried out by the Applicant;

b. may, with one week's written notice to the Applicant, enter Lot 4 for the purpose of carrying out or maintaining the rehabilitation work;

c. may retain the Bank Guarantee or Bond and/or enter Lot 4 in accordance with the preceding paragraph for three years after the expiration of this approval, or until the works prescribed by the Rehabilitation Management and Monitoring Plan have been satisfactorily completed (whichever is the later); and

d. must return the Bank Guarantee or Bond (or the balance thereof) to the Applicant at the expiration of that period.

21. Any refuelling activities shall be undertaken in accordance with the Department of Water and Environmental Regulations' Water Quality Protection Note - Toxic and Hazardous Substance Storage and Use. There is to be no storage of hydrocarbons on-site and no major vehicle or machinery repairs or maintenance is to take place on-site.

Advice Notes:

1. With reference to Condition No. 10, the Shire acknowledges previous agreements relating to the road improvement works undertaken by B & J Catalano Pty Ltd in lieu of providing annual monetary contributions until such time as the credit for previous improvement works has been exhausted.
2. Clearing of native vegetation is prohibited unless done under a clearing permit issued in accordance with the Environmental Protection Act 1986, or the clearing is exempt from the need for a clearing permit.
3. All extraction is required to remain compliant with:
   a. The Shire of Harvey Extractive Industry Local Law 2017, including the holding of a valid licence for all periods of operation;
   b. The Department of Water and Environmental Regulation's "Water Quality Protection Note 15 "Basic Raw Materials Extraction".

Date of determination: 17 March 2022

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.

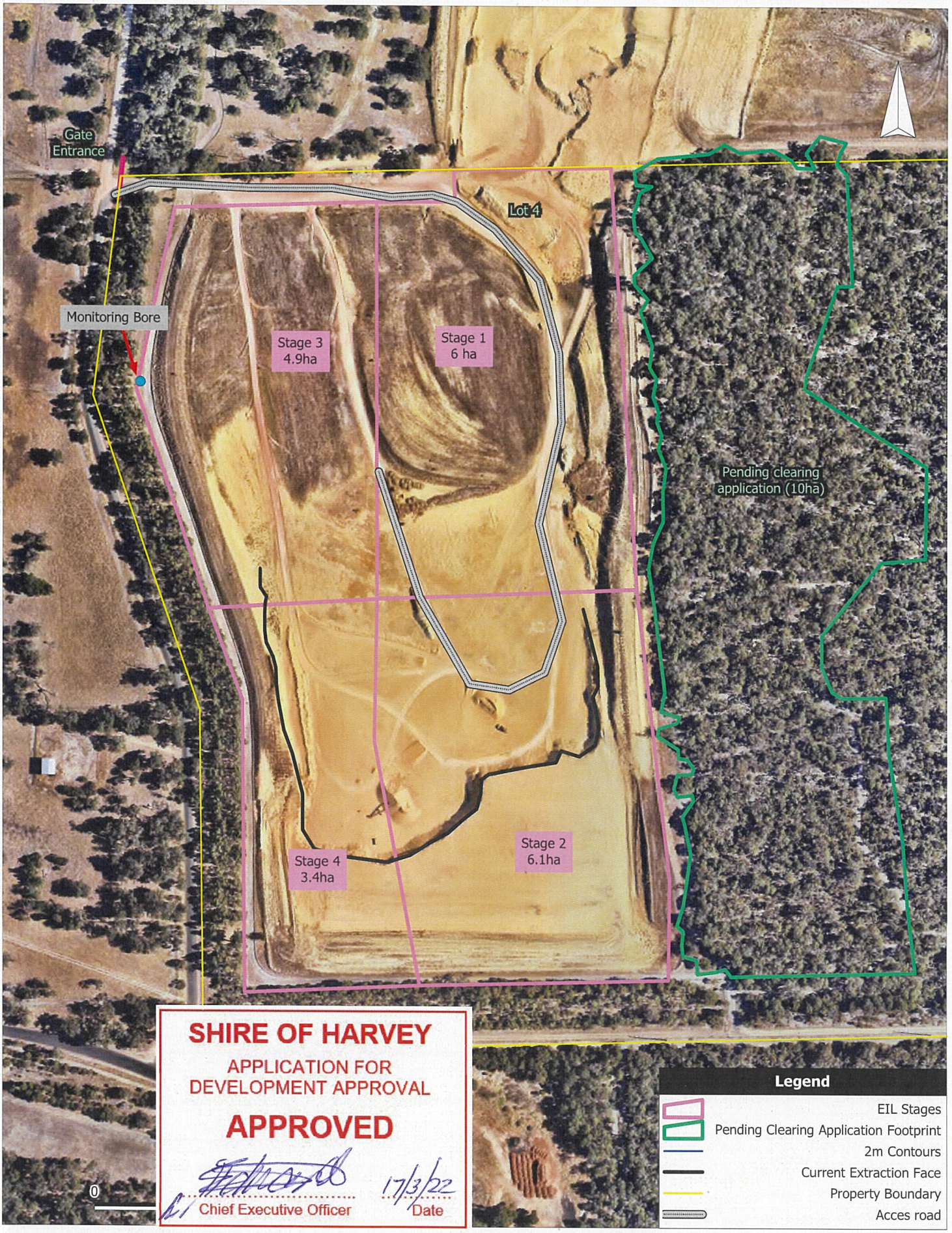
Note 2: Where an approval has so lapsed, no development must be carried out without the further approval of the local government having first been sought and obtained.

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.

Signed: .....

for and on behalf of the Shire of Harvey

Dated: 17 March 2022



Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863
mikelund1@bigpond.com

Scale: 1:3600
Original Size: A4
Air Photo Source: Nearmap Jan 2021
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B&J Catalano
Project: Sand Extraction
Location: Lot 4 Runnymede Road Wellesley

Figure 1:

Current Site Layout Shire Compliance 2021

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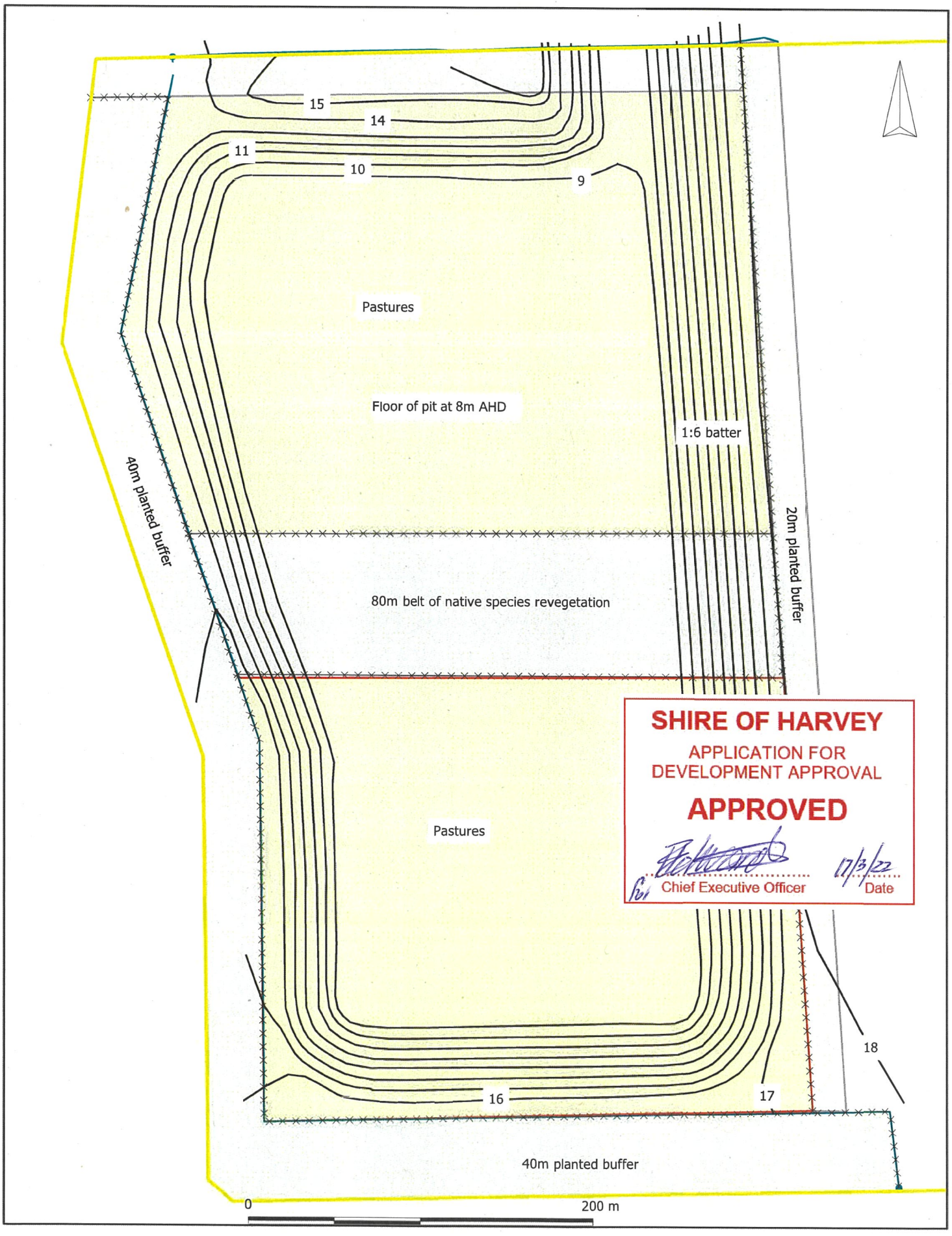
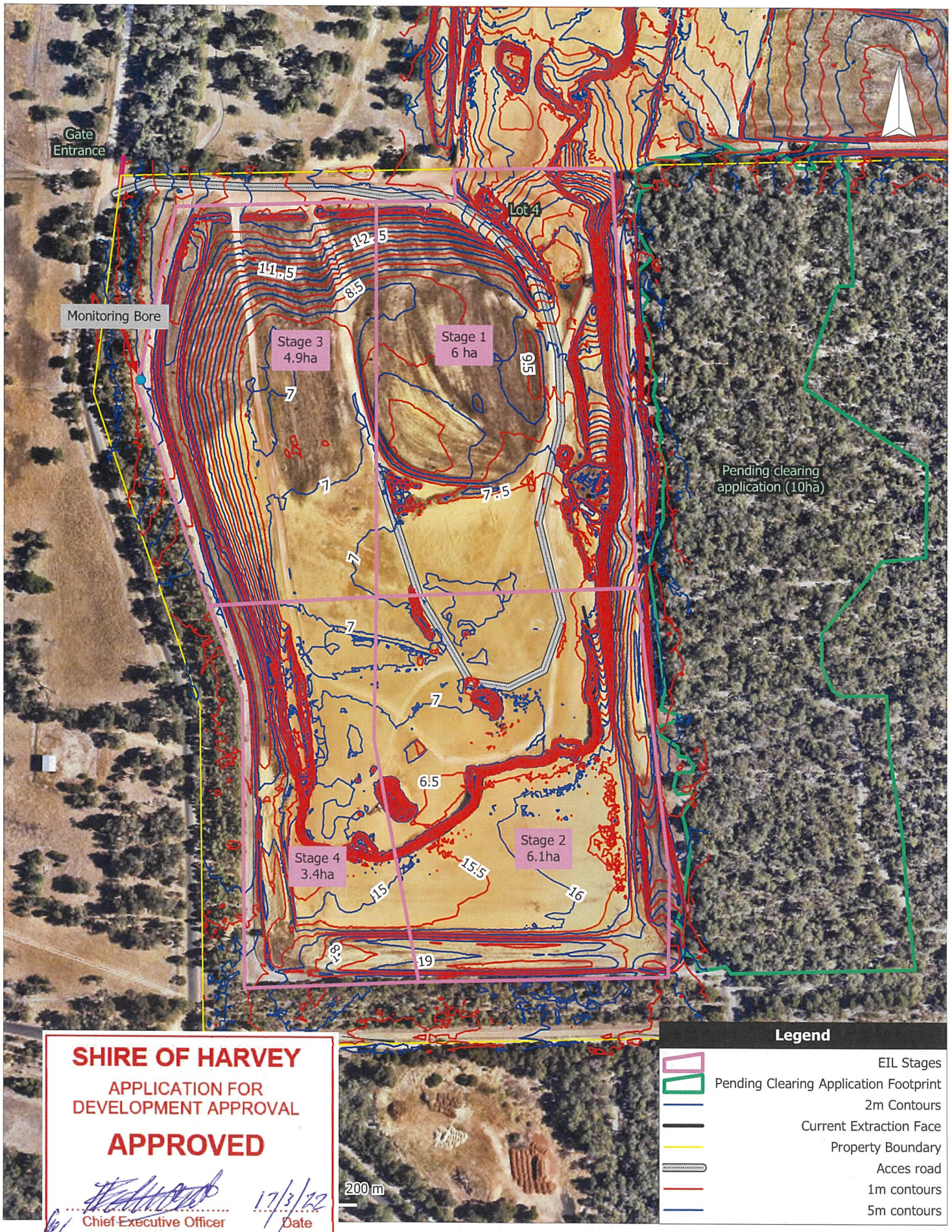


SHIRE OF HARVEY
APPLICATION FOR DEVELOPMENT APPROVAL
APPROVED
Chief Executive Officer
17/3/22
Date

LUNDSTROM ENVIRONMENTAL CONSULTANTS PTY LTD 21 Sellen Crt LEEMING WA 6149 mikelund1@bigpond.com 0417934863 www.Lundstrom-Environmental.com.au	Scale: 1:2800 Original Size: A4 Air Photo Date Datum: Australian Geocentric 1994 (GDA94)	**B&J Catalano Pty Ltd** **Lot 4 Runnymede Rd Wellesley Sand Extraction**	**Final Rehabilitation Plan** **Figure 2**

Y:\Catalano\Runnymede Rd\Lot 4 Runnymede Road\2017 EIL and PC Renewal\Appendicies & Mngmt Plans\Appdx 5 Rehab MP\Fig 1 Fin



SHIRE OF HARVEY

APPLICATION FOR DEVELOPMENT APPROVAL

APPROVED

Chief Executive Officer — Date 17/3/22

Legend

- EIL Stages
- Pending Clearing Application Footprint
- 2m Contours
- Current Extraction Face
- Property Boundary
- Acces road
- 1m contours
- 5m contours

Lundstrom Environmental Consultants Pty Ltd
Leeming WA 6149
Mob: 0417934863
mikelund1@bigpond.com

Scale: 1:3600
Original Size: A4
Air Photo Source: Nearmap Jan 2021
Datum: GDA94
Projection: Australia MGA94 (50)

Client: B&J Catalano
Project: Sand Extraction
Location: Lot 4 Runnymede Road Wellesley

Figure 3:

Current Landsurface

Z:\Catalano\Runnymede Rd Lots 4 & 7_Wellesley_SoH_Sand\Lot 4 Runnymede Road\EIL\Shire Compliance Reports\2021\Drawings\I

12.3. Sustainable Development

Item No.	**12.3.2.**
Subject:	**Proposed Extractive Industry (Sand) - Lot 4 Runnymede Road, Wellesley**
Proponent:	**B & J Catalano Pty Ltd**
Location:	**Lot 4 Runnymede Road, Wellesley**
Reporting Officer:	**Planning Officer**
Authorising Officer:	**Director Sustainable Development**
File No.:	**A002628/EX/004**
Attachments:	1. Application [**12.3.2.1** - 72 pages] 2. Table of Submissions Sept 21 [8XAE] [**12.3.2.2** - 2 pages]

Summary

An application for Development Approval and an Extractive Industry Licence application have been received for sand extraction on Lot 4 Runnymede Road, Wellesley (refer ***Attachment 1***). Officers consider that the application warrants refusal and therefore referral to Council is required as Officers do not have delegation to refuse the application.

It is recommended that the application be refused as the proposal is contrary to the matters to be considered in Clause 67(2)(a), (c), (fa), (o), (p) and (q) of the Planning and Development (Local Planning Schemes) Regulations 2015, as detailed in this report.

Background

Site Description

Lot 4 Runnymede Road, Wellesley is zoned "Kemerton Industry Buffer" under the Shire's District Planning Scheme No. 1 (the Scheme) and is located within 15kms of the Australind Village Shopping Centre and 4.3km east of Binningup townsite. The site is of regular shape with an area of 140.5ha and has a moderate slope varying from 15m AHD to 50m AHD.

The existing excavated areas are on the western portion of Lot 4, totalling 21ha and represents 15% of the entire Lot area. The remaining 120ha of the Lot has a dense coverage of high-quality jarrah/marri/banksia woodland. This area is known to be utilised by a wide range of native fauna species, including western ringtail possum and black cockatoos.

Site History

Prior to sand extraction commencing in 2007, the existing excavated area was pasture for grazing with some scattered trees. The 2007 extractive industry approval included the allowance of a nil setback to a portion of the northern boundary abutting Stage One of the adjoining Lot.

A second Development Approval was granted in April 2012, which expired in April 2017. The most recent approval was granted in July 2017, which expires in July 2022.

Proposal

The application proposes to extract sand from an additional area of 10ha which is occupied by native vegetation. Extraction is proposed in two stages of 5ha each as shown in figure 3 of the Applicant's report (refer ***Attachment 1***). It is estimated that 20,000m^3 of sand will be removed annually. To maintain a 1m separation to the groundwater, a finished pit floor level of 9m AHD is proposed.

The application also proposes to rehabilitate the subject area, together with a portion of the existing extraction site, by revegetating with native vegetation. An Offset Revegetation Report has been

provided as Appendix 7 of ***Attachment 1***.

Advertising

Pursuant to Clause 64 of the *Planning and Development (Local Planning Schemes) Regulations 2015* (the Deemed Provisions), the application was advertised to nearby landowners and referral authorities for a period of 28 days concluding on 4 December 2020. Despite the application being advertised to landowners within 1km of the extraction site, no responses were received.

Comment

Proposal

The proposal involves the extraction of sand from an area of 10ha currently occupied by high quality bushland that supports several important fauna habitats and flora species and can be summarised as:

- The subject area contains banksia dominated woodlands of the Swan Coastal Plain which listed as a Priority 3 (P3) ecological community under the *Environmental Protection Act 1986* (EP Act). P3 requires survey and/or definition of the community, and evaluation of its conservation status. The Banksia Woodlands are also a threatened ecological community (TEC), listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

- The vegetation is considered high quality habitat for the three State and Commonwealth- listed threatened black cockatoo species, *Calyptorhynchus latirostris*, *Calyptorhynchus baudinii* and *Calyptorhynchus banksii naso*.

- The proposed extraction area lies within the Drummond Botanical Sub-district of the Darling Botanical District, which falls within the Southwest Botanical Province and is recognised as having a very high degree of species diversity being characterised by Banksia woodland on leached sands with Melaleuca swamps; woodlands of tuart (*Eucalyptus gomphocephala*), jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*).

- The majority of the vegetation on the site is in 'excellent' condition, which meets the criteria for inclusion within the EPBC Act listed Banksia Woodlands TEC.

- Two Priority flora have been recorded directly to the east of the proposed extraction area: *Acacia semitrullata* (P4); and *Caladenia speciosa* (P4).

- With respect to native vertebrate fauna, 17 mammals (including nine bat species), 76 bird, 28 reptile and three frog species have previously been recorded in the wider area, some of which have the potential to occur in sections of the subject site at times. Seven species of introduced animals could also frequent the area. Of the 124 native animals that are listed as occurring or potentially occurring in the area, six are endangered/vulnerable or in need of special protection under State and/or Federal legislation (i.e., Carnaby's black cockatoo, Baudin's black cockatoo, Forest red-tailed black cockatoo, peregrine falcon, southwestern brush-tailed phascogale, and western ringtail possum).

- With respect to fauna habitat values, the majority of the vegetation is in good to very good condition and would therefore have the capacity to support a wide range of the predicted fauna species.

- The area was found to contain 200 potential black cockatoo breeding habitat trees. Eight trees appear to contain hollows with larger entrances (greater than 10 cm) that were possibly big enough to allow the entry of a black cockatoo into a suitably sized and orientated branch/trunk,

though none showed any sign of current or previous use by cockatoos for this purpose.

- Almost all the remnant vegetation present within the surveyed area (~18.9 ha) can be regarded as quality foraging habitat for black cockatoos given the presence of jarrah, marri and/or banksia in all areas.

Advertising

A total of three submissions were received from referral agencies. A summary of the submissions is provided in ***Attachment 2***.

Matters to be Considered by the Local Government

Clause 67 of the Deemed Provisions provides matters that Council is required to give due regard to when considering an application. The following "Matters to be Considered" are relevant to this application and are discussed below:

- *The aims and provisions of this Scheme and any other - Clause 67 (2)(a)*

  Objective (g) in clause 1.6.1 states as follows:

  > *"to protect and preserve the more important natural flora and fauna habitats (ecosystem, biodiversity, and essential ecological processes), and other environmentally sensitive areas that are prone to degradation on the principle that the extent and manner of use of these areas should be kept within their capabilities of being sustained without degradation in the long term."*

  This proposal is directly in conflict with this objective as it involves the removal of 10ha of high-quality native vegetation and priority flora. In addition, the native vegetation supports endangered and threatened fauna habitats.

  Supporting the clearing of native vegetation that:

  - Is regionally and nationally significant;
  - Is nationally protected; and
  - Provides habitat for nationally protected fauna

  is contrary to this objective.

- *Approved State Planning Policies – Clause 67(2)(c)*

  A relevant objective of State Planning Policy 2: Environment and Natural Resources (SPP 2) is *"to protect, conserve and enhance the natural environment"*. The Policy also provides that:

  - *"The implementation of planning decisions can have an impact on the environment …" "… decision-making should:*
    - *Avoid development that may result in unacceptable environmental damage.*
    - *Protect significant natural … features, including sites and features significant as habitats and for their floral … built … visual or wilderness values.*
    - *Support conservation, protection, and management of native remnant vegetation where possible, to enhance soil and land quality, water quality,*

biodiversity, fauna habitat, landscape, amenity values and ecosystem function.

- *Seek to avoid or minimise any adverse impacts, directly or indirectly, on areas of high biodiversity or conservation value as a result of changes in land use or development.*

- *Identify and safeguard landscapes with high … ecological values, as well as those of aesthetic, cultural or historical value to the community, and encourage the restoration of those that are degraded.*

- *"Biodiversity is also fundamental to the quality and character of the landscape and in providing … aesthetic value and cultural identity. Planning should recognise the State's biodiversity in considering changes of land use"*

In addition to SPP 2, State Planning Policy 2.4: Basic Raw Materials (SPP 2.4) provides the following:

- *avoid and/or minimise the potential negative impacts on amenity and the environment arising from an extractive industry, when identifying areas for future growth.*

Another State Planning Policy 2.5: Rural Planning (SPP 2.5) has an objective to *"protect and sustainably manage environmental, landscape … assets."* The provisions of this Policy provide the following:

- *seek to protect rural land as a State resource by:*

  - *ensuring retention and protection of rural land for biodiversity protection, natural resource management and protection of valued landscapes and views.*

- *intensive agriculture is generally supported and encouraged on rural land provided rural amenity and environmental impacts can be effectively managed.*

- *Environmental and landscape attributes will be managed and improved by:*

  - *supporting the inclusion into strategies and schemes of provisions that promote protection of valued landscape and views, as required.*

The Rural Planning Guidelines linked to SPP 2.5 provides that, when assessing proposals, consideration should be given to *"clearing of vegetation."*

Supporting the clearing of the subject vegetation would therefore be inconsistent with the above identified objectives and principles of these SPP's and Guidelines.

- *Endorsed Local Planning Strategy – Clause 67(2) (fa)*

  A relevant objective of the Shire's endorsed Local Planning Strategy is *"Protecting the significant areas of remnant vegetation, conservation category wetlands and local/regional ecological linkages."*

- *Likely effect on natural environment – Clause 67(2)(o)*

  The site comprises many trees, with canopies spaced close to one another. As stated in the Applicant's report *"The area is largely comprised of a jarrah and marri open woodland over a banksia low woodland." "Ground cover and low shrubs vary in density from area to area being very sparse at some locations and dense in others. Hollow bearing trees makeup about 25% of the trees present based on the habitat tree survey."*

The vegetation includes a few flora species and provides habitat for several fauna species. As such, the removal of the existing vegetation on the site will have a significant effect on the natural environment

- *Provision for landscaping and preservation of vegetation – Clause 67(2)(p)*

  As provided in the Offset Revegetation Report, the excavated 10ha area will be *"revegetated to native vegetation to a good condition."* Notwithstanding, the existing vegetation on the site should be preserved as it contains a high quality of trees that justify protection. The majority of the vegetation on the site is in 'excellent' condition, which meets the criteria for inclusion within the EPBC Act listed Banksia Woodlands TEC and is characterised by high quality Banksia woodland on leached sands with Melaleuca swamps; woodlands of tuart (*Eucalyptus gomphocephala*), jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*).

- *Suitability of land – Clause 67(2)q)*

  The removal of the trees, as identified in SPP 2, *"can have a profound effect on land quality by removing its protective cover and creating the potential for erosion, salinity and loss of soil and water quality."* This being the case, the proposed vegetation clearing has the potential to create irreversible damage on the land quality.

Conclusion

As detailed in the Proposal section of this report, the subject area contains banksia dominated woodlands of the Swan Coastal Plain which is listed as a Priority 3 (P3) ecological community under the *Environmental Protection Act 1986* (EP Act). The Banksia Woodlands are also a threatened ecological community (TEC), and the vegetation is considered high quality habitat for the three State and Commonwealth- listed threatened black cockatoo species.

The proposed extraction area is recognised as having a very high degree of species diversity being characterised by Banksia woodland on leached sands with Melaleuca swamps; woodlands of tuart and is in 'excellent' condition, which meets the criteria for inclusion within the EPBC Act listed Banksia Woodlands TEC.

With respect to native vertebrate fauna, 17 mammals (including nine bat species), 76 bird, 28 reptile and three frog species have previously been recorded in the wider area, some of which have the potential to occur in sections of the subject site at times. Seven species of introduced animals could also frequent the area. Of the 124 native animals that are listed as occurring or potentially occurring in the area, six are endangered/vulnerable or in need of special protection under State and/or Federal legislation (i.e., Carnaby's black cockatoo, Baudin's black cockatoo, Forest red-tailed black cockatoo, peregrine falcon, southwestern brush-tailed phascogale and western ringtail possum).

The area was found to contain 200 potential black cockatoo breeding habitat trees and the remnant vegetation present within the surveyed area of 18.9ha can be regarded as quality foraging habitat for black cockatoos given the presence of jarrah, marri and/or banksia in all areas.

Given the above information regarding the environmental values of the land that is proposed to be extracted, it is considered that this application is contrary to the matters to be considered in Clause 67(2)(a), (c), (fa), (o), (p) and (q) of the Planning and Development (Local Planning Schemes) Regulations 2015 and therefore Officer's recommend the application be refused.

Statutory/Policy Environment

Planning and Development Act 2005

Planning and Development (Local Planning Schemes) Regulations 2015

- Schedule 2 – Deemed Provisions, Section 64 – Advertising Applications:

(1) "An application for development approval must be advertised under this clause if the proposed development – "

(e) is of a type that this Scheme requires to be advertised."

(3) The local government may advertise, or require the applicant to advertise, an application for development approval in one or more of the following ways –

(a) By giving notice of the proposed use or development to owners and occupiers of properties in the vicinity of the development who, in the opinion of the local government, are likely to be affected by the granting of development approval, including a statement that submissions may be made to the local government by a specified day being a day not less than 14 days from the day on which the notice is given to the person;

(b) By publishing a notice of the proposed use or development by electronic means is a form approved by the local government CEO including a statement that submissions may be made to the local government by a specified day being a day not less than 14 days from the day on which the notice is published."

- Schedule 2 – Deemed Provisions, Clause 67 – Consideration of application by local government:

(2) In considering an application for development approval (other than an application on which approval cannot be granted under subclause (1)), the local government is to have due regard to the following matters to the extent that, in the opinion of the local government, those matters are relevant to the development the subject of the application —

(a) the aims and provisions of this Scheme and any other local planning scheme operating within the Scheme area;

(c) any approved State planning policy;

(fa) any local planning strategy for this Scheme endorsed by the Commission;

(n) the amenity of the locality including the following —

i.) environmental impacts of the development;

ii.) the character of the locality;

iii.) social impacts of the development;

(o) the likely effect of the development on the natural environment or water resources and any means that are proposed to protect or to mitigate impacts on the natural environment or the water resource;

(p) whether adequate provision has been made for the landscaping of the land to

which the application relates and whether any trees or other vegetation on the land should be preserved;

(q) the suitability of the land for the development taking into account the possible risk of flooding, tidal inundation, subsidence, landslip, bush fire, soil erosion, land degradation or any other risk

(za) the comments or submissions received from any authority consulted under clause 66

Shire of Harvey District Planning Scheme No.1

"1.6.1 The objectives of the Scheme are:

(g) to protect and preserve the more important natural flora and fauna habitats ecosystem, biodiversity, and essential ecological processes), and other environmentally sensitive areas that are prone to degradation on the principle that the extent and manner of use of these areas should be kept within their capabilities of being sustained without degradation in the long term."

"4.8.1 The Kemerton Strategic Industrial Area is made up of the land zoned Kemerton Strategic Industry, Kemerton Ancillary Industry, and Kemerton Industry Buffer. The objectives of the Kemerton Strategic Industrial Area are to:

(b) provide industrial development areas that:

iii) achieve beneficial economic, environmental and community outcomes;

iv) enable environmental protection and management arrangements that minimise impact on the natural environment;"

Strategic Framework

The Shire's Strategic Community Plan 2021 – 2031, states:

Goal 3:	*A natural environment that is highly valued, protected and enjoyed.*
Objective 3.1	*Adopt and encourage sustainable development practices.*
Objective 3.2	*Manage and protect natural habitats, ecosystems and reserves.*
Objective 3.3	*Sustainable resource use and waste management.*

Community Engagement

Community Participation Goal

Inform: To provide the public with balanced and objective information to assist them in understanding the problems, alternatives and/or solutions.

Promise to the Community

Inform: We will keep you informed.

Risk Management

The Risk Theme Profile identified as part of this report is **Providing Inaccurate Advice/Information**.

The Consequence could be ***Environmental, Financial, Reputational or Compliance*** if incorrect advice is given or a condition missed. The risk is considered ***Minor*** and the likelihood ***Unlikely***, given that the report has been thoroughly researched, peer reviewed and provided by a qualified Shire Officer. This results in a ***Low*** risk being present.

Budget Implications

Nil.

Authority/Discretion

Quasi-Judicial: When Council determines an application/matter that directly affects a person's right and interests. The judicial character arises from the obligation to abide by the principles of natural justice. Examples of Quasi-Judicial authority include town development applications, building permits, applications for other permits/licenses (e.g., under Health Act, Dog Act or Local Laws) and other decisions that may be appealable to the State Administrative Tribunal.

Voting Requirements

Simple Majority

Officer's Recommendation

That Council refuses the Application for Development Approval for Sand Extraction on Lot 4 Runnymede Road, Wellesley, as the proposal is contrary to the following provisions of Clause 67(2) of the Planning and Development (Local Planning Schemes) Regulations 2015:

a) Does not protect and preserve the more important natural flora and fauna habitats and is therefore contrary to Clause 67(2)(a) and Clause 1.6.1(g) of the Shire of Harvey District Planning Scheme No. 1;

b) Does not:

   i) protect, conserve, and enhance the natural environment;

   ii) ensure the retention and protection of rural land for biodiversity protection;

   iii) protect valued landscapes;

   iv) effectively manage environmental impacts;

   v) manage and improve environmental and landscape attributes;

   and is therefore contrary to Clause 67(2)(c) and the objectives and principles of State Planning Policies 2.0, 2.4 and 2.5;

c) Does not protect significant areas of remnant vegetation or balance the environmental and visual objectives and is therefore contrary to Clauses 67(2) (fa) and the Shire of Harvey's endorsed Local Planning Strategy;

d) Will have a significant effect on the natural environment and is therefore contrary to Clause 67(2)(o);

e) Does not make provision for the preservation of vegetation and is therefore contrary to Clause 67(2)(p); and

f) Has the potential to create irreversible damage to the land quality by creating the potential for

erosion and loss of soil and is therefore contrary to Clause 67(2)(q).

Cr. Carbone left the Chamber at 5.13pm

Moved: Cr. Bromham Seconded: Cr. Krispyn

That Council refuses the Application for Development Approval for Sand Extraction on Lot 4 Runnymede Road, Wellesley, as the proposal is contrary to the following provisions of Clause 67(2) of the Planning and Development (Local Planning Schemes) Regulations 2015:

a) Does not protect and preserve the more important natural flora and fauna habitats and is therefore contrary to Clause 67(2)(a) and Clause 1.6.1(g) of the Shire of Harvey District Planning Scheme No. 1;

b) Does not:

i) protect, conserve, and enhance the natural environment;

ii) ensure the retention and protection of rural land for biodiversity protection;

iii) protect valued landscapes;

iv) effectively manage environmental impacts;

v) manage and improve environmental and landscape attributes;

and is therefore contrary to Clause 67(2)(c) and the objectives and principles of State Planning Policies 2.0, 2.4 and 2.5;

c) Does not protect significant areas of remnant vegetation or balance the environmental and visual objectives and is therefore contrary to Clauses 67(2) (fa) and the Shire of Harvey's endorsed Local Planning Strategy;

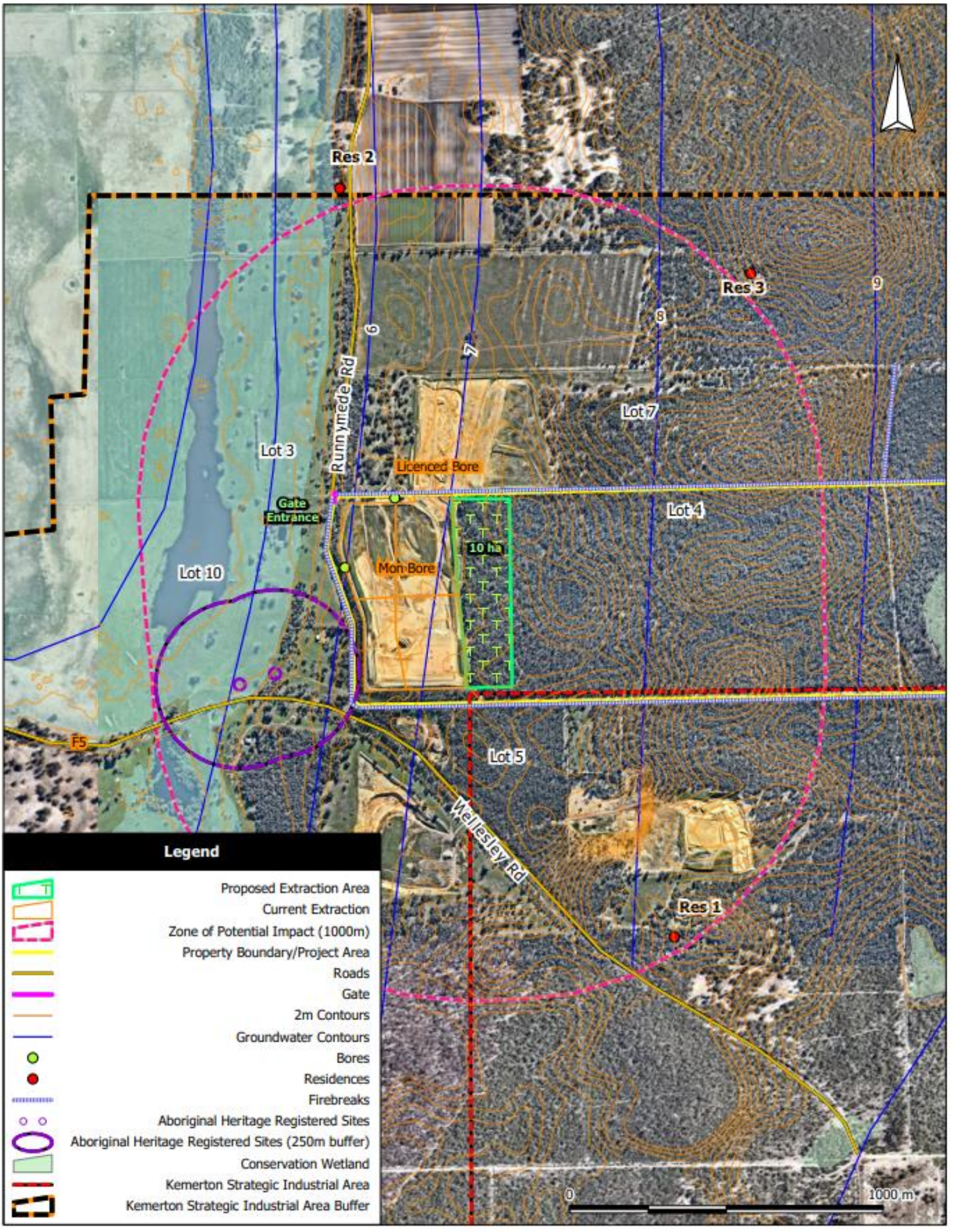
d) Will have a significant effect on the natural environment and is therefore contrary to Clause 67(2)(o);

e) Does not make provision for the preservation of vegetation and is therefore contrary to Clause 67(2)(p); and

Has the potential to create irreversible damage to the land quality by creating the potential for erosion and loss of soil and is therefore contrary to Clause 67(2)(q).

Carried 12-0 21/239

Cr. Carbone entered the Chamber at 5.13pm



Lundstrom Environmental Consultants Pty Ltd
!1 Sellen Court, Leeming 6149
Mob: 0417934863
mikelund1@bigpond.com

Scale: 1:15000
Original Size: A4
Air Photo Date: Nearmap July 2020
Datum: Australian Geocentric 1994 (GDA94)

B & J Catalano
Lot 4 Runnymede Rd, Wellesley
Sand Extraction

Figure 1

Site and Surrounds

Lundstrom Environmental Consultants Pty Ltd
!1 Sellen Court, Leeming 6149
Mob: 0417934863
mikelund1@bigpond.com

Scale: 1:2500
Original Size: A4
Air Photo Date: Nearmap July 2020
Datum: Australian Geocentric 1994 (GDA94)

B & J Catalano
Lot 4 Runnymede Rd,
Wellesley
Sand Extraction

Figure 3

Proposed Extraction Area

Western Australian Planning Commission

Our Ref : 612-36-1
Your Ref : 12/6233
Enquiries : Scott Penfold (Ph 9791 0588)

Commissioner Of Main Roads WA
Po Box 6202
EAST PERTH, WA 6004

Application for Approval to Commence Development plans dated 16 November 2021 received .

Lot Number	:	21
Location	:	Wellesley
Plan / Diagram	:	90568
Volume/Folio	:	2069/649
Locality	:	Runnymede Road, Wellesley
Owner	:	Commissioner Of Main Roads Po Box 6202 EAST PERTH WA 6892

Under the provisions of the *Planning and Development Act 2005* this application has been referred for determination by the Western Australian Planning Commission.

The application has now been considered by the Commission and the formal notice setting out the terms of the decision is attached.

A copy of this decision has been forwarded to the Local Government for information.

ADVICE TO APPLICANT
This decision is issued pursuant to the provisions of the Greater Bunbury Region Scheme, and has been made by the Commission after due consideration of the regional planning implications of the proposal. The Commission's decision, therefore, is made without prejudice to any others that may be separately required from Council.

Should the applicant be aggrieved by this decision there is a right of review pursuant to the provisions of Section 252 of the *Planning and Development Act 2005*. Such an application for review must be submitted to the State Administrative Tribunal, Level 6, State Administrative Tribunal Building, 565 Hay Street, PERTH WA 6000 in accordance with Part 14 of the *Planning and Development Act 2005*. It is recommended that you contact the State Administrative Tribunal for further details (telephone 9219 3111) or go to its website:

South West Office, Sixth Floor, Bunbury Tower, 61 Victoria Street, Bunbury, Western Australia 6230
Tel: (08) 9791 0577; Fax: (08) 9791 0576; TTY: (08) 9264 7535; Infoline: 1800 626 477
e-mail: info@dplh.wa.gov.au; web address: http://www.dplh.wa.gov.au
ABN 35 482 341 493

Western Australian Planning Commission

HYPERLINK http://www.sat.justice.wa.gov.au.

i. The Department of Planning, Lands and Heritage recommends that reference be made to the State's Aboriginal Heritage Due Diligence Guidelines.

ii. The Applicant is advised of their obligations under the Environment Protection and Biodiversity Conservation Act 1999.

iii. The Application states that crushing or screening of material is not required, it notes that should that situation change, the South West Gateway Alliance will be responsible for gaining a Works Approval. Activities such as crushing and screening during extractive industry operations, may cause the premises to become prescribed for the purposes of Part V Division 3 of the 'Environmental Protection Act 1986' (EP Act). This will occur if the proposed crushing or screening equipment has a design capacity (when operated 24/7 or at a capacity limited by a planning approval) that meets or exceeds the specified production or design capacity of the relevant category under Schedule 1 of the 'Environmental Protection Regulations 1986'.

iv. MRWA has negotiated with the adjacent landowner (Lot 7, to the south) to remove the batter along the adjoining boundary and continuing the finished level across between the two properties and for all vehicles to access Runnymede Road from Lot 7. The Department notes that Lot 7 is subject to an Extractive Industry Licence issued by the Shire of Harvey, which contains conditions that may require amendment, if the batter is to be removed.

In regard to Condition 5 the need for road maintenance on that section of road fronting Lot 21 will be removed if all vehicle traffic accesses Runnymede Road from Lot 7.

v. It is the Commission's expectation that data collected from continuous monitoring of groundwater levels across the site is provided regularly to the Department of Water and Environmental Regulation to ensure operational compliance with all environmental standards is met.

Ms Sam Fagan
Secretary
Western Australian Planning Commission

23 December 2021

South West Office, Sixth Floor, Bunbury Tower, 61 Victoria Street, Bunbury, Western Australia 6230
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e-mail: info@dplh.wa.gov.au; web address: http://www.dplh.wa.gov.au
ABN 35 482 341 493

Western Australian Planning Commission

Our Ref : 612-36-1
Your Ref : 12/6233
Enquiries : Scott Penfold (Ph 9791 0588)

PLANNING AND DEVELOPMENT ACT 2005

Shire of Harvey

APPROVAL TO COMMENCE DEVELOPMENT

Name and Address of Owner and Land on which Development Proposed:

Owner	:	Commissioner Of Main Roads Po Box 6202 EAST PERTH WA 6892
Lot Number	:	21
Location	:	Wellesley
Plan / Diagram	:	90568
Volume/Folio	:	2069/649
Locality	:	Runnymede Road, Wellesley
Application Date	:	16 November 2021
Application Receipt	:	17 November 2021
Development Description	:	Public Works - Extractive Industry

The application for approval to commence development of a sand extraction pit on Lot 21 Runnymede Road, Wellesley, in accordance with the plans submitted thereto is granted subject to the following condition(s):

1. The Approved Development shall, at all times, comply with the approved Environmental Management Plan V0.3, November 2021 and Pit Management Plan IFCv2, November 2021, unless varied by conditions of this approval.

2. The Applicant is to have the following management plans prepared and approved to the satisfaction of the Western Australian Planning Commission:
   a. A Dust Management Plan in consultation with the Shire of Harvey.
   b. A Noise Management Plan in consultation with the Shire of Harvey.
   c. A Rehabilitation Management Plan in consultation with the Department of Primary Industries and Regional Development.
   d. A Dieback Management Plan in consultation with the Department of Biodiversity, Conservation and Attractions, consistent with the 'Best Practice Guidelines for Management of Phytophthora Dieback in the Basic Raw Materials Industries, Dieback Working Group Inc 2021'.

South West Office, Sixth Floor, Bunbury Tower, 61 Victoria Street, Bunbury, Western Australia 6230
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e-mail: info@dplh.wa.gov.au; web address: http://www.dplh.wa.gov.au
ABN 35 482 341 493

Western Australian Planning Commission

3. The Applicant shall engage a suitably qualified independent expert to carry out an Annual Audit of Compliance of the conditions of Development Approval.
The first Annual Audit of Compliance shall be submitted within 12 months of works commencing and thereafter annually to the Shire, with any necessary remediation works to be undertaken by the applicant to the satisfaction of the Shire.
The Annual Audit of Compliance shall also include a progress report on the conditions of the approved Rehabilitation Management and Monitoring Plan including:
   a. Details of completed, ongoing and future rehabilitation areas;
   b. Photos of rehabilitated areas;
   c. Monitoring and reporting details, if available;
   d. Start and completion dates, and expected start dates, if applicable; and
   e. A map depicting the rehabilitation areas and their completion progress.
   f. The first Annual Audit of Compliance shall be submitted within 12 months of works commencing and thereafter annually to the Shire.

4. A survey plan shall be provided annually with the Annual Audit of Compliance required by Condition No. 2 detailing the levels in m AHD of the active and non-rehabilitated extraction areas.

5. An annual contribution shall be made towards the maintenance and upgrading of Runnymede Road in accordance with the methodology adopted by WALGA in the document "Estimating the Incremental Cost Impact on Sealed Local Roads from Additional Freight Tasks, May 2015".

6. No crushing or screening activities shall occur unless a Works Approval or other appropriate Licence or Registration has been obtained from the Department of Water and Environmental Regulation as required by Part V of the *Environmental Protection Act 1986.*

7. Stockpiles shall be kept to a maximum height of 5m to avoid visual impact and/or material wind drift.

8. Operating hours are restricted to 7.00 a.m. — 5.00 p.m., Monday to Friday and 7.00 a.m. — 12.00 noon on Saturday. No activities to occur on Sunday or Public Holidays.

9. All Management Plans, referenced in Condition 1 shall be implemented to the satisfaction of the Shire of Harvey.

10. Any refuelling activities and activities involving hazardous chemicals shall be undertaken in accordance with the Department of Water and Environmental Regulations' Water Quality Protection Note No.56 - Toxic and Hazardous Substance Storage and Use. There is to be no storage of hydrocarbons on-site and no major vehicle or machinery repairs or maintenance is to take place onsite.

11. Any proposed clearing of native vegetation is prohibited unless done under a clearing permit issued in accordance with the Environmental Protection Act 1986, or the clearing is exempt from the need for a clearing permit.

South West Office, Sixth Floor, Bunbury Tower, 61 Victoria Street, Bunbury, Western Australia 6230
Tel: (08) 9791 0577; Fax: (08) 9791 0576; TTY: (08) 9264 7535; Infoline: 1800 626 477
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Western Australian Planning Commission

12. A risk assessment to the Threatened Ecological Community on the eastern portion of Lot 21 Runnymede Road is to be undertaken by a suitably qualified practitioner in consultation with the Department of Biodiversity, Conservation and Attractions. This risk assessment is to assess groundwater depletion, soil compaction and tree root exposure as possible outcomes of extraction on the Threatened Ecological Community. If setbacks are required, these are to be reflected in the Environmental Management Plan and Pit Management Plan.

13. The proposed extraction is to be implemented in accordance with the Department of Water and Environmental Regulation's Water Quality Protection Note No. 15 'Basic raw materials extraction', where appropriate to the site situation, to ensure risks to water resources are appropriately mitigated.

14. Excavation shall be undertaken to the maximum depth of 9.0 m AHD at the eastern end of the pit grading to the maximum depth of 7.5 m AHD at the western end, unless otherwise approved by the Western Australian Planning Commission, in consultation with the Department of Water and Environmental Regulation, following site specific groundwater monitoring being undertaken.

15. Groundwater shall not be exposed, extracted or dewatered during the operation of the extraction activities unless the appropriate approval has been obtained from the Department of Water and Environmental Regulation. The Shire of Harvey is to be notified within 24 hours if the water table is intercepted and no dewatering works are to be undertaken without consultation with the Department of Water and Environmental Regulation.

16. On-site piezometers shall be maintained during extraction to allow for the continued collection of data to ensure the required separation distances to highest ground water levels are achieved for the duration of the excavation.

17. All stormwater is to be managed within the cadastral boundary of Lot 21 Runnymede Road.

18. A Bushfire Emergency Evacuation Plan being prepared and implemented in consultation with the Shire of Harvey.

If the development the subject of this approval is not substantially commenced within a period of two years from the date of this letter, the approval shall lapse and be of no further effect. Where an approval has so lapsed, no development shall be carried out without the further approval of the responsible authority having first been sought and obtained.

SFagan

Ms Sam Fagan
Secretary
Western Australian Planning Commission

23 December 2021

South West Office, Sixth Floor, Bunbury Tower, 61 Victoria Street, Bunbury, Western Australia 6230
Tel: (08) 9791 0577; Fax: (08) 9791 0576; TTY: (08) 9264 7535; Infoline: 1800 626 477
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ABN 35 482 341 493

Lundstrom Environmental Consultants Pty Ltd

Leeming WA 6149
Mob: 0417934863, mikelund1@bigpond.com

Scale: 1:4400
Original Size: A4
Air Photo Source: Nearmap Aug 2021
Datum: GDA94
Projection: Australia MGA94 (50)

Client: SWGA
Project: Sand Extraction
Location: Lot 21 Runnymede Road, Wellesley

Figure 3: Proposed Operations

Z:\Catalano\South West Gateway Alliance\Lot 21 Runnymede Rd_Wellesley_SoH_Sand\Drawing\F3 Proposed Operations.map 10/25/2021 Layout 2

In the matter of:	**an application for review which the Minister for Planning has called-in and decided to determine**
Pursuant to:	**the *Planning and Development Act 2005*, sections 246 and 247**
Formerly:	**State Administrative Tribunal proceeding DR 63 of 2022**
Applicant:	**B & J Catalano Pty Ltd**
Respondent:	**Shire of Harvey**
Relating to:	**a proposed extractive industry Lot 7 Runnymede Road, Wellesley**

WITNESS STATEMENT OF ELIZABETH EDWARDS FORMING PART OF MATERIALS SUBMITTED ON BEHALF OF THE RESPONDENT

INTRODUCTION

1. My full name is Elizabeth Rose Edwards.

2. My occupation is Town Planner.

3. I am the Manager Planning Services at the Shire of Harvey.

4. I have been employed by the Shire of Harvey since May 2016 in town planning roles. During the period of August 2021 – February 2022, I was in the role of Manager Governance as well as Manager Planning Services.

5. I commenced employment in town planning in October 1998. Prior to my employment with the Shire of Harvey, I have worked for the City of Armadale, the City of Gosnells and the Shire of Dardanup, in town planning roles.

6. I have performed the full range of tasks of a local government town planner in relation to rural, urban and townsite planning. I have extensive experience in, among other things, assessing extractive industry proposals.

7. A copy of my curriculum vitae is **attachment ERE 1** to this statement.

8. The development application is to be found in the Respondent's Bundle (**RBD**) **pp. 1 - 80**, being a document entitled '*B & J Catalano: Extractive Industry Licence Application & Environmental Management Plan (EMP): Lot 7 on Diagram 40591 Runnymede Road, Wellesley*', which includes four Figures and six Appendices. Appendix 1 (**RBD p. 25**) is the signed '*Application for Amending or Cancelling a Development Approval*'.

However, I understand the whole compilation at pp. 1 - 80 to be the development application under review.

BACKGROUND AND PROPOSAL SUMMARY

9. The subject Lot 7's location in broader context is at Figure 1 (**RBD p. 20**).

10. Figure 2 (**RBD p. 21**) shows the proposed extension area to existing excavation which is the subject of this appeal, in green shading.

11. Also on Figure 2 is:

- Areas already extracted under previous approval (outlined in purple);
- Area of an existing approval for extraction in blue/purple shading.

12. Figure 3 (**RBD p. 22**) focuses on the light green and blue/purple areas in closer detail.

13. Lot 7 Runnymede Road is 80.2ha and is zoned "General Farming" under the Shire of Harvey District Planning Scheme No. 1. Extractive Industry is an "SA" use under the Scheme, being a use that the local government may, at its discretion, permit the use after advertising.

14. An area of approximately 15.8ha has been subject to sand extraction (the area delineated purple) since 2011 in conjunction with the adjoining Lot 4 to the south. An additional area of 1.97ha to the north-east was approved for sand extraction in September 2020 (the area shaded blue/purple). Of the remaining eastern portion of Lot 7, approximately 50ha contains dense native vegetation.

15. The subject application proposes to extract approximately 70,000m^3 of sand from an area of 1.17ha.

LUNDSTROM FLORA REPORT

16. A flora and vegetation survey was commissioned by the applicant in September 2018 on a 16ha portion which includes most of the 1.17ha area the subject of this application. The survey report, by Lundstrom Environmental Reports, is at **RBD pp. 81 - 162 (Lundstrom Flora Report)**. It was issued in March 2019 based on the September 2018 inspections.

17. I refer to Figure 9 of the Lundstrom Flora Report at **RBD p. 126**. It is a map of vegetation condition, as assessed by Lundstrom Consultants, of the area covered by that study. Figure 9 shows the areas that were assessed as 'Excellent', 'Very Good', Good' and 'Degraded' vegetation condition.

18. **Attachment ERE 2** to this statement is a super-imposition of the subject application area onto the relevant part of Figure 9 of the Lundstrom Flora Report. As such, it shows the areas shown as 'Excellent', 'Very Good', Good' and 'Degraded' vegetation condition within the appeal site. Attachment ERE 2 does not show cadastral boundaries. The purple lines are the boundaries of the Lundstrom Flora Report study area, not the cadastral boundaries.

19. Attachment ERE 2 shows that there is a portion of the western part of the subject extraction extension area which was not the subject of the Lundstrom Flora Report. The applicant has not presented any flora or vegetation report to the Shire to address that portion of the site. I would regard that as the onus of the applicant. The Shire and the Minister are not in a position to determine that the area not surveyed by Lundstrom

is *not* subject to flora and fauna issues – in circumstances where the surrounding vegetation has been assessed as subject to the attributes outlined below.

20. The following provides a summary of the vegetation attributes sourced in part from the survey relevant to the 1.17ha portion of the site:

- Contains Banksia Woodlands of the Swan Coastal Plain which is listed as a:
    - Threatened Ecological Community (TEC) under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act): see esp. para 5.3 of Lundstrom Flora Report
    - Priority 3 Ecological Community (PEC) under the *Environmental Protection Act 1986* (WA) (EP Act): ibid.
- Within the modelled distribution of the Forest Red-tailed Black Cockatoo, Carnaby's Cockatoo and Baudin's Cockatoo. The Black Cockatoos are listed as Vulnerable and Endangered under the EPBC Act: 60th page of Lundstrom Flora Report.
- The vegetation has the potential to provide breeding habitat and provides foraging and roosting habitat for the Black Cockatoos.
- Recognised as having a very high degree of species diversity being characterised by Banksia woodland on leached sands with Melaleuca swamps; woodlands of tuart (*Eucalyptus gomphocephala*), jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla)*.
- Majority of the vegetation within the 1.17ha site is notated as being in 'Good' condition, some is in 'Very Good' condition and some is in 'Excellent' condition: attachment ERE 2.
- Contains potential habitat for the Western Ringtail Possum, which is listed as Threatened under the EPBC Act: 61st page
- Vegetation suitable to support a range of fauna: 60th, 61st page.

21. The TEC was listed under the EPBC Act (Cth) on 16 September 2016. A copy of the Conservation Advice is at **RBD p. 192 -236**.

22. Priority Ecological Communities listed under the EP Act as priority 1, 2 or 3 are *"possible threatened ecological communities that do not meet survey criteria or that are not adequately defined"*: DWER Priority *Ecological Communities for Western Australia* Version 32 (dated 15 July 2021) para 1, extracts at **RBD p. 286 -287**. A copy of the *Definitions, Categories and Criteria for Threatened and Priority Ecological Communities* is at **RBD p. 288 - 294**.

OTHER EXTRACTIVE INDUSTRY APPROVALS IN IMMEDIATE VICINITY

Existing approvals for Lot 7

23. The western most, already -disturbed part of the subject Lot 7, has had development approval from the Shire since 2011. Its development approval has been for five-year periods at a time.

24. The strip of land immediately north of the appeal site, was approved by way of a consolidated development approval with the existing disturbed area, under a

development approval granted under delegation by myself in September 2020. A copy of the development approval for the already-approved extraction areas on Lot 7, is at **RBD pp. 432 - 437**. The area immediately to the north of the appeal site, had only a small number of trees, as is apparent for example from Figure 3 of the development application: **RBD p. 22**. It didn't raise the same environmental issues as the present.

Lot 4 Runnymede Road. Wellesley

25. Lot 4, to the immediate south of Lot 7, also has a development approval for the already-disturbed area. The history of this is:

    - Approved by Council in February 2007 (mostly cleared area of 27ha with 25 individual jarrah or marri trees). Estimated resource was 750,000m^3. Licence was issued June 2007 with an expiry of March 2012.

    - Approved by Council in April 2012 (re-approval of 2007 area). Estimated resource was 800,000m^3. Licence was issued September 2012 with an expiry of April 2017.

    - Approved by Council in July 2017 (re-approval of 2007 area). Estimated resource was 330,000m^3. Licence was issued October 2018 with an expiry of July 2022.

    - Previous approval amended under delegation in March 2022 (re-approval of 2007 area) to extend the term of approval and Licence to March 2027. A copy of the current (March 2022) development approval for Lot 4, is at **RBD pp. 438 - 444**.

26. An application to expand extraction eastwards by 10ha was refused by Council in November 2021. A copy of the minutes of the Council meeting are at **RBD pp. 445 - 455**.

27. That refusal is currently the subject of SAT DR 10 of 2022. That appeal was not called-in by the Minister.

28. SAT appeal DR 10 of 2022 raises, in the Shire's opinion, essentially the same issues as the present appeal which is now before the Minister. Both would involve clearing of Banksia Woodlands of the Swan Coastal Plain.

Lot 21 Runnymede Road, Wellesley

29. Main Roads WA obtained an approval from the Western Australian Planning Commission under the *Greater Bunbury Region Scheme* for an extractive industry on Lot 21, which is to the immediate north of Lot 7. I understand that this was undertaken as a public work, and that there was accordingly no opportunity for the Shire to grant development approval. A copy of the WAPC development approval for the Lot 21 extractive industry is at **RBD pp. 456 - 451**.

REASONS FOR REFUSAL

30. The subject application was determined under delegation by myself, and was refused. A copy of the notice of refusal is at **RBD pp. 177- 180**.

31. An internal memo was prepared within the Planning Department of the Shire concerning the merits of the subject application. That memo was considered by me as the decision-maker who had delegated authority to make the decision. A copy of that memo is at **RBD pp. 163 - 166**.

32. In the applicant's Grounds of Review in this appeal, the applicant notes that the Shire's reasons for refusal were based on environmental grounds. The applicant claims that environmental grounds should only be handled by the Department of Water and Environmental Regulation (**DWER**).

33. In my opinion and my understanding, environmental grounds are included within planning considerations. In this witness statement, I identify numerous provisions of the applicable planning framework that require the planning decision maker (and not just environmental agencies under separate statutory powers) to have due regard to environmental considerations.

34. Some planning appeal decisions have been made upholding environmental grounds as the sole grounds of refusal. An example is ***Carbone Bros Pty Ltd and Shire of Harvey*** [2021] WASAT 150: **RBD pp 295 to 350**.

35. In any event, the DWER had not made any decision on permits required under its legislation, when the time came for the Shire to make its development approval decision. The Shire was required to give due regard to all relevant planning considerations, which includes environmental considerations. This was not a case where the Shire could have had due regard to a DWER decision, because there wasn't one. In my experience, normally DWER has not made decisions on clearing permits until the Shire has determined the development application. DWER's practice, in my experience, has always been basically to limit its comment to the Shire to saying that a clearing permit may be required. Therefore, Shire assessment is independent to DWER's. In the present application, it was referred to DWER, and they replied in the form of **RBD p. 167 - 176**.

36. The ***Carbone Bros*** SAT appeal just mentioned, concerned six Tuart trees that formed part of a patch of Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain, being a TEC listed under the EPBC Act. Once the appeal had started, DWER provided an Agreement in Principle for the clearing permit during the SAT review process. Nevertheless, SAT determined that the correct preferable decision was to refuse development approval, and the SAT had due regard for, but came to a different opinion on, the treatment of the environmental issues, from DWER.

37. Clause 67 of the Deemed Provisions provides a list of matters that the local government is required to give due regard when considering an application. The following "Matters to be Considered" were relevant to this application and are discussed below:

Clause 67 (2)(a): The aims and provisions of this Scheme

38. Objective (g) in clause 1.6.1 of the Shire of Harvey District Planning Scheme No. 1 (Scheme) states as follows:

> *"to protect and preserve the more important natural flora and fauna habitats (ecosystem, biodiversity, and essential ecological processes), and other environmentally sensitive areas that are prone to degradation on the principle that the extent and manner of use of these areas should be kept within their capabilities of being sustained without degradation in the long term."*

39. The site contains native vegetation listed under the EP Act and protected under the EPBC Act that is in 'good, very good and excellent' condition. This native vegetation also has potential to provide breeding habitat for the Black Cockatoos and Western Ringtail Possum, and provides foraging and roosting habitat for the Black Cockatoos, which are also protected under the EPBC Act. It is therefore appropriate that this

native vegetation is considered as *"important natural flora and fauna habitats"* pursuant to clause 1.6.1 of the Scheme.

40. At the time of assessing the Banksia Woodland TEC for listing under the EPBC Act, it was estimated that the pre-European extent was approximately 706,000 to 708,000 ha. The estimated extent remaining in 2015 was approximately 336,000 to 337,000 ha. This indicates an overall decline in extent of approximately 52% across the entire Swan Coastal Plain: Conservation Advice 97th page.

41. Fragmentation has resulted in only 37.6% of the original distribution now present as larger patches over 100 ha in size. The proportion of larger patches over 100 ha in size has markedly declined. While the majority of patches and extent in the original distribution comprised such large remnants, fragmentation is such that only 3.7% of remnants were over 100 ha in size in 2015: Conservation Advice 98th page.

42. The continued fragmentation, clearing and other threats to the ecological community, suggests that the ecological community could be lost across much of its range within the near future: Conservation Advice 106th page.

43. *The Native Vegetation Policy for Western Australia* (released May 2022) applies to all WA State Government agencies to contribute to a net gain and landscape-scale conservation and restoration of our native vegetation. The Policy provides that agencies will make deliberate and well-informed decisions, consider and transparently account for the values of native vegetation in decision making that affects it. They are to apply the mitigation hierarchy steps to any planned impacts on native vegetation: Native Vegetation Policy 9th page

44. Supporting the clearing of native vegetation that:

- Is regionally and nationally significant;
- Is nationally protected;
- Provides, or has the potential to provide, habitat for nationally protected fauna; and
- Is considered as *"important natural flora and fauna habitats"*

is contrary to this objective of the Scheme. Subsequent to giving due regard to the aims and provisions of the Scheme, supporting the clearing of the subject native vegetation would be inconsistent with the principles of orderly and proper planning and therefore is not supported.

Clause 67(2)(c): Approved State Planning Policies

45. There are a number of State Planning Policies that were relevant to the consideration of this application:

<u>State Planning Policy 2: Environment and Natural Resources (SPP 2)</u>

46. A relevant objective of SPP 2 is *"to protect, conserve and enhance the natural environment"*. The Policy also provides that:

> *"The implementation of planning decisions can have an impact on the environment …" "… decision-making should:*
>
> - *Avoid development that may result in unacceptable environmental*

damage.

- *Protect significant natural … features, including sites and features significant as habitats and for their floral … built … visual or wilderness values.*

- *Support conservation, protection, and management of native remnant vegetation where possible, to enhance soil and land quality, water quality, biodiversity, fauna habitat, landscape, amenity values and ecosystem function.*

- *Seek to avoid or minimise any adverse impacts, directly or indirectly, on areas of high biodiversity or conservation value as a result of changes in land use or development.*

- *Identify and safeguard landscapes with high … ecological values, as well as those of aesthetic, cultural or historical value to the community, and encourage the restoration of those that are degraded.*

"Biodiversity is also fundamental to the quality and character of the landscape and in providing … aesthetic value and cultural identity. Planning should recognise the State's biodiversity in considering changes of land use"

State Planning Policy 2.4: Basic Raw Materials (SPP 2.4)

47. SPP 2.4 provides the following:

avoid and/or minimise the potential negative impacts on amenity and the environment arising from an extractive industry, when identifying areas for future growth.

Basic Raw Materials Guidelines

48. The Guidelines linked to SPP 2.4 provides that, when assessing proposals, consideration should be given to *"the effect of the proposed extractive industry on any native flora and fauna…"*.

State Planning Policy 2.5: Rural Planning (SPP 2.5)

49. SPP 2.5 has an objective to *"protect and sustainably manage environmental, landscape … assets."* The provisions of this Policy provide the following:

seek to protect rural land as a State resource by:

- *ensuring retention and protection of rural land for biodiversity protection, natural resource management and protection of valued landscapes and views.*

Rural Planning Guidelines

50. The Guidelines linked to SPP 2.5 provides that, when assessing proposals, consideration should be given to *"clearing of vegetation."*

51. The proposed development requires the clearing of native vegetation that is listed under the EP Act and protected under the EPBC Act that is in 'good, very good and excellent' condition. This native vegetation also has potential to provide breeding habitat for the Black Cockatoos and Western Ringtail Possum, and provides foraging

and roosting habitat for the Black Cockatoos, which are also protected under the EPBC Act.

52. The Conservation Advice for the Banksia Woodland TEC provides that the areas of the vegetation complex *"considered critical to the survival of the Banksia Woodlands covers all patches that meet the key diagnostic characteristics and condition thresholds for the ecological community, plus the buffer zones, particularly where this comprises surrounding native vegetation."* The Banksia Woodlands TEC occurs in a landscape that has often been very heavily cleared and modified, and now exists as mostly very small and highly fragmented patches. Additional areas of the vegetation community that do not meet the minimum condition threshold may also be critical to the survival of the Banksia Woodlands TEC as they could retain some biodiversity or habitat values. Certain sub-communities of the Banksia Woodlands TEC also merit consideration as critical elements to protect and some are recognised as threatened in their own right in WA and, as such, are priorities for protection: Conservation Advice 27th page The Conservation Advice also identifies that the greatest threat to the Banksia Woodlands TEC is clearing and fragmentation: Conservation Advice 30th page

53. The Recovery Plan for the Forest Red-tailed Black Cockatoo and Baudin's Cockatoo provides that the principal cause of the historic decline of these Black Cockatoos has been habitat loss and the long-term effects of this habitat loss may not yet have been fully realised. Further, habitat loss is an increasing threat on the southern Swan Coastal Plain: Recovery Plan 14th page

54. The Recovery Plan for the Carnaby's Cockatoo provides that the greatest risk to these Black Cockatoos is the loss or degradation of feeding habitat adjacent (within 12km) to breeding sites. A further significant threat is the clearing, fragmentation and degradation of foraging and night roosting habitat, particularly the clearing of feeding habitat on the Swan Coastal Plain: Recovery Plan 17th page.

55. Given the significance and importance of the Banksia Woodlands TEC, in my opinion, clearing the subject land would:

- Cause unacceptable environmental damage.
- Not protect sites significant as habitats.
- Not provide for the conservation or protection of native remnant vegetation to enhance biodiversity and fauna habitat.
- Not avoid or minimise any adverse impacts on areas of high biodiversity or conservation value.
- Not safeguard landscapes with high ecological values.
- Not avoid or minimise potential negative impacts on the environment arising from an extractive industry.
- Not ensure the retention and protection of rural land for biodiversity protection.

56. SPP 2.4 identifies the sand resource on Lot 7 as "Significant Geological Supplies". As per SPP 2.4, the identification as "Significant Geological Supplies" does not guarantee approval for its extraction.

57. As provided in SPP 2, recognition should be given to the State's biodiversity when considering land use changes. Supporting the clearing of the subject vegetation would be contrary to the above identified objectives and principles of these SPP's and

Guidelines and therefore the Shire does not support the proposal.

Clause 67(2) (fa): Endorsed Local Planning Strategy

58. A relevant objective of the Shire's endorsed Local Planning Strategy is *"Protecting the significant areas of remnant vegetation, conservation category wetlands and local/regional ecological linkages."*

59. As the subject native vegetation:

- Is regionally and nationally significant;
- Is nationally protected; and
- Provides, or has the potential to provide, habitat for nationally protected fauna

supporting the proposal does not protect this area of significant remnant vegetation would inconsistent with the Shire's endorsed Local Planning Strategy and is therefore not supported by the Shire.

Clause 67(2)(o): Likely effect on natural environment

60. The conservation objective for the Banksia Woodland TEC provided in the Conservation Advice is *to "mitigate the risk of extinction of the Banksia Woodlands of the Swan Coastal Plain ecological community, and help recover its biodiversity and function, through:*

- *protecting it using the Environment Protection and Biodiversity Conservation Act 1999; and*
- *implementing priority conservation actions.":* Conservation Advice 5th page.

61. The Conservation Advice provides that the highest priority actions include:

> *"Prevent further clearance, fragmentation or detrimental modification of remnants of the ecological community and of surrounding native vegetation, for example, during residential development, basic raw materials extraction, and associated infrastructure development. High conservation value, unmodified and older growth areas are particularly important for retention and management"*: Conservation Advice, para 5.2.1.

62. With respect to offsets, the Conservation Advice provides that priority actions include:

> *"further clearance and damage to this ecological community should not occur. Therefore, offsetting is a last resort. It should only be proposed as an attempt to compensate for damage to the ecological community that is deemed unavoidable."* Conservation Advice, para 5.4.

The clearing of 1.17ha of Banksia Woodland TEC in Good, Very Good and Excellent condition for the minor amount of 70,000m^3 of sand is not considered to be unavoidable.

63. Given the subject native vegetation:

- Is regionally and nationally significant;
- Is nationally protected; and

- Provides, or has the potential to provide, habitat for nationally protected fauna

clearing of this native vegetation is likely to have a significant effect on the natural environment and therefore supporting the proposal would be contrary to clause 67(2)(o).

Clause 67(2)(p): Provision for landscaping and preservation of vegetation

64. The clearing of the subject native vegetation will not preserve native vegetation that:

- Is regionally and nationally significant;
- Is nationally protected; and
- Provides, or has the potential to provide, habitat for nationally protected fauna.

65. Therefore, the proposal is inconsistent with clause 67(2)(p).

Clause 67(2)(q): Suitability of land

66. As identified in SPP 2, the clearing of vegetation *"can have a profound effect on land quality by removing its protective cover and creating the potential for erosion, salinity and loss of soil and water quality."* This being the case, the proposed vegetation clearing has the potential to create irreversible damage on the land quality.

OTHER MATTERS TO BE CONSIDERED

Clause 67(2)(b): Requirements of orderly and proper planning

67. The following comments have regard to the principles judicially developed in the interpretation of the 'orderly and proper' planning consideration, from the case of ***Marshall v Metropolitan Redevelopment Authority*** [2015] WASC 226**.** The proposal needs to be assessed and determined in accordance with the principles of orderly and proper planning. To be orderly and proper, the assessment and determination of the proposal needs to be done in an 'orderly' (disciplined, methodical, logical and systematic, and which is not haphazard or capricious) way with planning discretion being directed to identify the 'proper' use of the land (suitable, appropriate or apt or correct use of land clearly having regard to any applicable legislation, subsidiary legislation, planning schemes and policy instruments).

68. While the exercise of discretion will involve a judgement about what is suitable, appropriate, or apt or correct in a particular case, that judgement must (if it is to be 'orderly') be an objective one. If the exercise of discretion is to be an orderly one, the planning principles identified as relevant to the proposal should not be lightly departed from without the demonstration of a sound basis for doing so, which basis is itself is grounded in planning law or principle.

69. The planning principles considered relevant to this proposal are:

- Aims and provisions of the Shire of Harvey District Planning Scheme No. 1.
- State Planning Policies 2, 2.4 and 2.5 and the linked Guidelines.
- Shire of Harvey Local Planning Strategy.

70. No sound basis has been provided to depart from the identified planning principles for

this proposal. Therefore, giving consideration to the principles of orderly and proper planning, in my opinion, the subject application should not be supported.

STATE OR REGIONAL SIGNIFICANCE

71. The subject application relates to the extraction of a small volume of sand – a volume which will not provide a solution to the regional issue of available sand resources. It is considered that the Shire of Harvey has demonstrated that the subject application has been assessed and determined based on the principles of orderly and proper planning.

72. The following details as to sand volumes are applicable:

    (1) Existing approval for subject Lot 7 has total remaining resources of 295,000m^3: **RBD p. 12**;

    (2) Subject application is for 70,000m^3: Ibid;

    (3) If the appeal is allowed, Lot 7's remaining resource from approved areas would be 365,000m^3: Ibid;

    (4) A compliance audit of July 2021 for Lot 4 showed a remaining resource on the approved (already disturbed) area of somewhere between 94,000m^3 and 114,000m^3;

    (5) The estimated volume of sand resource on the portion of Lot 4 that was refused development approval and is now under appeal in SAT appeal DR 10 of 2022, is 147,000m^3;

    (6) The volume from the approval for Lot 21 (MRWA site) is approximately 2.9 million cubic metres;

    (7) The volume required for the Bunbury Outer Ring Road (BORR) is understood to be upward of 6 million cubic metres.

73. In my opinion, the volumes of sand that would be made available if the appeal was approved, would be insignificant relative to the need for sand for the BORR, as understood by the Shire.

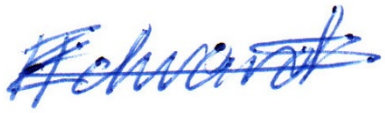
74. If it is said that there is a lack of available sand for the BORR, in close proximity to the BORR works sites, and that transporting sand from further afield would be expensive, then in my opinion, the approval of a sand resource for a mere 70,000m^3 would make little difference to the availability. If it reduces the sand price at all, it could only do so for a short period, and that would in my opinion be a very small benefit achieved at the very high cost of irreversible environmental damage.

Reducing demand for basic raw materials: *Bunbury Geographe Sub-regional Strategy*

75. **Attachment ERE 3** to this statement comprises the first 10 pages of the *Bunbury Geographe Sub-regional Strategy*, January 2022. I refer to Part 3, '*Strategic directions*' commencing on page 7, which states that the strategic directions are organised into themes. Under the theme 'Economy', strategic direction 24 states:

> **'**Undertake a study of the supply and demand of basic raw materials within the sub-region and the opportunities for alternative building construction techniques to reduce demand from the building and construction industries.'

76. This is a very specific, single-industry sector identified for study. The BORR is sure to be the largest single project in the Greater Bunbury region in the foreseeable future requiring basic raw materials. Furthermore, it is a government project, and my understanding is that government proponents should be model proponents in terms of following broader government policy. For these reasons, in my opinion, the need for the study has greatest relevance to the BORR. This supports the idea that planning authorities, including the Minister on appeal, should not accept uncritically, a claim that a sand resource from a particular site is vital to the viability of industry, and the BORR in particular. It should be examined as to whether there are alternative techniques that could partly reduce the reliance on sand.



Elizabeth Edwards

18 July 2022

ELIZABETH R EDWARDS

14 Reef Place, Leschenault WA 6233
craig.liz@westnet.com.au
044 777 3386

QUALITIES:

* Dedicated
* Organised
* Driven
* Great under pressure
* Hard working
* Great communicator
* Fast learner
* Multi-skilled
* Ambitious
* Produce quality work quickly
* Conflict resolution
* Time management

EMPLOYMENT HISTORY:

May 2016 – Currently — **Shire of Harvey**

Manager Planning Services
(July 2020 – currently)

Additional duties as Manager Planning Services:

* Budget preparation, implementation, monitoring & review
* Staff management, training & performance reviews
* Overseeing extractive industry application and approval process
* Complex and high profile applications
* Compliance and prosecution
* Acting as Director Development Services

Special Projects Undertaken:

* Finalisation of Local Planning Strategy
* Preparation of new Local Planning Scheme
* Detailed review of Extractive Industry application and approval process
* Planning Framework reform

Manager Governance (maternity leave cover)
(August 2021 – February 2022)

Duties as Manager Governance:

* Council Meeting agenda
* Complete review of all Delegations and Authorisations
* Complaints
* Leases
* Procurement
* Local Government Reform
* Staff management, training & performance reviews

Senior Planning Officer
(December 2017 – July 2020)

Additional duties as Senior Planning Officer:

* Allocation of applications
* Application statistics
* Assessment of complex applications
* Review of Local Planning Policies
* Review of Delegations and Authorisations
* Compliance and prosecution
* Acting as Manager Planning Services

Planning Officer
(May 2016 – December 2017)

Duties specific to Planning Officer position:

* Development and Subdivision applications
* Customer enquiries
* Council reports
* Compliance
* Bushfire/BAL Assessments

ELIZABETH R EDWARDS
14 Reef Place, Leschenault WA 6233
craig.liz@westnet.com.au
044 777 3386

December 2014 – May 2016 **Home Duties**

July 2006 – December 2014 **Shire of Dardanup**

Manager Development Services (November 2012)

As Manager Development Services, I managed and provided leadership to 6 staff members from the Planning, Building and Environmental Health departments whilst undertaking high level strategic projects and organisation-wide projects.

Duties specific to Manager position included:

* Budget preparation, implementation, monitoring & review
* Staff management, training & performance reviews

Special Projects Undertaken:

* GIS - OBRM Bushfire Prone Area Map Review (2014)
* Local Planning Strategy (2014)
* Records/Data Management System Review (2014)
* Workflow Procedure/Management Review (2014)
* Municipal Heritage Inventory Review (2014)
* Town Planning Scheme Review (2014)
* East of Eaton Working Group (2013/2014)
* Shire Website Design Team (2013/2014)
* GIS (Town Planning Scheme & General Maps) (2013/2014)
* GIS System Implementation (2013/2014)
* Heritage Strategy 2013 – 2023 (2013)

Principal Planning Officer (May 2007)

Planning Officer (July 2006)

As the Planning Officer and Principal Planning Officer, I undertook duties expected of these positions in addition to handling the complex applications and queries as well as special projects.

Duties specific to Planning Officer positions included:

* Development, Subdivision, Scheme Amendment applications and Structure Plans

Special Projects Undertaken:

* Strategic Community Plan 2013 – 2023 (2012)
* Development Contribution Plan & Report - Dardanup Townsite Expansion Area (2012)
* Eaton & Millbridge Community Aspirations Project (2012)
* Dardanup Community Aspirations Project (2012)
* Burekup Community Aspirations Project (2012)
* Population & Demographics: Projections (2009)
* Burekup Townsite Expansion Strategy (2009)
* Town Planning Scheme Review (2009)
* Scheme Amendment No. 152 – Upcoding of Eaton (2009)

Duties common to all positions:

* Acting as Director Development Services
* Compliance audits, compliance from complaints, legal action and prosecutions

ELIZABETH R EDWARDS
14 Reef Place, Leschenault WA 6233
craig.liz@westnet.com.au
044 777 3386

- Scheme Amendments for Shire
- Subdivision of Council owned land
- SAT Reviews
- Policy development & review
- Reports to Council
- Community consultation and workshops
- General enquiries
- Presentations to Council
- Positions on various Council Committees
- Formulation and updating of Information Brochures
- Formulation and updating of internal Practice Notes

July 2001 – June 2006

City of Gosnells

Planning Officer (November 2003)

Planning Assistant (September 2003)

Duties included:

- Development, Subdivision and Scheme Amendment applications
- Appeals
- Policy development
- Reports to Council
- General enquiries

Special Projects undertaken:

- Provision of Gravity Sewer in TPS 17

Planning Assistant – Land Administration

Duties included:

- Development, Subdivision and Scheme Amendment applications
- Appeals
- PAW closures
- Land administration (Buying & Selling Land, Closures, etc)
- Reports for Council
- General enquiries

October 1998 – July 2001

City of Armadale

Planning Services Officer

Duties included:

- Front counter development enquiries
- Advertising Sign applications
- Development applications
- Property zoning enquiries
- Preparation of reports for Committee/Council
- Compilation of statistics for Committee/Council
- General IT support to team members
- Telephone enquiries

Special Projects undertaken:

- Development towards a new Town Planning computer system (Synergysoft)

ELIZABETH R EDWARDS
14 Reef Place, Leschenault WA 6233
craig.liz@westnet.com.au
044 777 3386

* Advertising Signs Local Law Review
* Heritage Country Tourism Signage Strategy

May 1998 – September 1998 — **Phillips Fox**

Legal Secretary for three Solicitors

March 1998 – May 1998 — **City of Armadale**
Temporary

Technical Services Clerk

January 1995 – March 1998 — **Stork Protech (Australia) Pty Ltd / Stork Engineering & Contracting Pty Ltd**
Full Time (made redundant)

Secretarial / Administration
Secretarial / Accounts Assistant

June 1991 – January 1995 — **Crusty Loaf Hot Bread Shop**
Part Time

COMMUNITY / VOLUNTEER BACKGROUND:

Bunbury Barbarians Junior Rugby Union
2021 *Team Manager – U12s*
2020 *Team First Aid Officer – U10s*

2015 - 2016 — **Glen Huon Primary School**
School Board Member

2014 - 2016 — **Bunbury BMX Club Management Committee**
President

Roles undertaken include:
Grants & Marketing Manager, First Aid Coordinator, Governance, Coaching Coordinator,

Bunbury Barbarians Junior Rugby Union
2012 *Coach – U7s*
2013 *Committee Member – Shire Liaison*

EDUCATIONAL BACKGROUND:

2016 — **Fire Protection Association of Australia**
Building and Planning in Bushfire Prone Areas

2013 — **Central Institute of Technology**
Diploma of Management

ELIZABETH R EDWARDS
14 Reef Place, Leschenault WA 6233
craig.liz@westnet.com.au
044 777 3386

2011 **University of New England**
Award – *Bachelor of Arts*
Course Studied – *Bachelor of Urban and Regional Planning*

Units completed and passed:
* Understanding Australia's Economic Performance
* Earth in Crisis?
* Critical Reasoning
* Issues and Politics
* Rural Planning and Resource Management
* Cradle to Grave: Population Geography
* Urban Living
* Introduction to Environmental Engineering
* Cyberspace
* Coasts and Catchments
* Advanced Population Studies
* Impact Assessment in Natural Resource Management
* Understanding Research
* Your Place or Mine? People and Power in Place

Units granted as Advanced Standing (previous studies):
* Introduction to GIS
* Communication Skills: Composition
* Australia: Sustainable Development?
* The World of Planning: An Introduction
* Professional Planning Skills
* Introduction to Environmental Design

Units granted for Professional Experience:
* Principles of Development Control
* Unspecified elective units

1994 **Alexander Business College**
Advanced Certificate in Secretarial Studies (Executive Secretarial)

1990 - 1993 **Kelmscott Senior High School**
Secondary School Graduation Certificate

EDUCATIONAL OTHER:

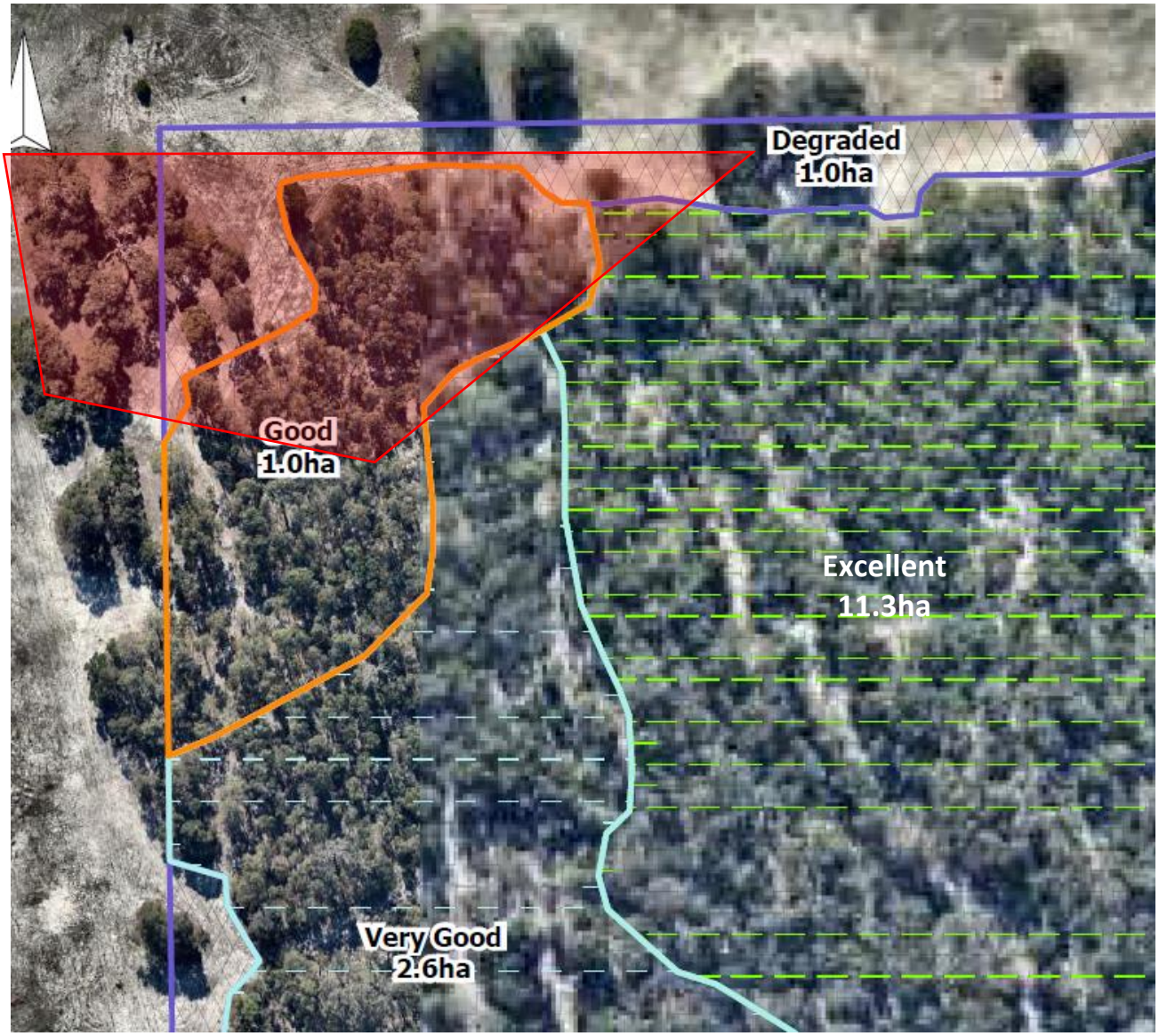
April 2022 **St John Ambulance**
Provide First Aid

December 2020 **Local Government Insurance Services**
Operational Leadership Program

June 2011 **RAC Driving Centre**
Defensive Driving on Gravel Roads

ATTACHMENT ERE 2

Lot 7 Runnymede (A002575/EX/004)
Approximate proposed extension area overlayed onto vegetation survey



- Red polygon equates to the proposed EIL extension area.
- Purple outline equates to the survey area of Lundstrom Flora and Vegetation Survey report.
- Cadastral boundaries are not shown on this plan.

Department of **Planning, Lands and Heritage**

GOVERNMENT OF WESTERN AUSTRALIA

ATTACHMENT ERE 3

Western Australian Planning Commission

Bunbury-Geographe

Sub-regional Strategy

January 2022

Acknowledgement of Country

The Bunbury-Geographe sub-region is a contemporary description of a portion of the ancestral lands of the Binjareb, Wilman, Wadandi and Ganeang Noongar people. The Western Australian Planning Commission acknowledges the First Australians as the traditional owners of these lands and pays respect to their Elders past and present.

The *Noongar (Koorah, Nitja, Boordahwan) (Past, Present, Future) Recognition Act 2016* recognises the living cultural, spiritual, familial and social relationship that the Noongar people have with the Noongar lands; and includes the following recognition statement:

Noonakoort moort nitja burranginge noongar boodja

Noonakoort moort kwomba

Djinunge nitja mungarrt — koorah

Noonakoort moort yirra yarkinje kwomba noongar boodja

Koorah — nitja — boordahwan

Noonakoort moort yarkinje noongar boodja

Nyidiung koorah barminje noonakoort moort

Wierrnbirt domberrinje

Noonakoort moort koort boodja

Nitja gnulla moorditj karrl boodja

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Gordon Stephenson House
140 William Street, Perth WA 6000

Locked Bag 2506
Perth WA 6001

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website: www.dplh.wa.gov.au
email: info@dplh.wa.gov.au

tel: 08 6551 8002
fax: 08 6551 9001
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Chairman's Foreword

Bunbury-Geographe in Western Australia's south west offers residents and visitors a unique lifestyle based on the sub-region's beautiful natural settings, strong communities and economic opportunities.

This enviable lifestyle, together with the sub-region's strategic location, has driven strong population and economic growth in recent decades.

The *Bunbury-Geographe Sub-regional Strategy* plans for further growth to unlock the sub-region's vast potential. It provides clear directions and actions to guide the future planning and development of land within the sub-region to 2050. The Strategy supports the growth of local communities and plans for a substantial increase in the sub-region's population and economy. With this comes a variety of new challenges, requiring a balance between benefiting existing attributes and maximising strengths while looking ahead to the needs of future residents and visitors to the sub-region.

Specifically, the Strategy identifies the Bunbury Metropolitan Area and promotes it as Western Australia's second city. It also supports investment to diversify Collie's economy and grow the hinterland settlements in the sub-region.

I commend the comprehensive and collaborative approach taken in the preparation of the Strategy. I extend my appreciation to the members of the Steering Group, especially to the Chair of the Bunbury Development Committee and the elected members from the six local governments, who represented their respective communities with passion and vision. I also acknowledge all of the other stakeholders who contributed to or made submissions during the development of the Strategy.

David Caddy
Chairman
Western Australian Planning Commission

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Image courtesy City of Bunbury

EXECUTIVE SUMMARY

Over the past few decades, the Bunbury-Geographe sub-region has gone a long way to fulfil its considerable potential through its strategic location, natural resources and diverse economy.

Around the sub-region's largest centre of Bunbury, the development of new urban areas such as Dalyellup, Glen Iris and Treendale has seen the population and economy grow to a metropolitan level. The Strategy recognises this and identifies the Bunbury Metropolitan Area as the contiguous built-up area that extends across the City of Bunbury and into neighbouring localities in the Shires of Capel, Dardanup and Harvey.

The Bunbury Metropolitan Area is the driving force for development within the sub-region, and serves as a commercial, administrative and employment hub for the wider South West region. The role of the Bunbury Metropolitan Area as Western Australia's second city will continue to increase in importance as the population grows towards 200,000 and beyond.

The sub-regional centre of Collie is experiencing change of a different nature, and is transitioning to a more sustainable economy with a greater range of industries. The Strategy supports investment and initiatives to help Collie with this economic transition.

These major centres are complemented by a diverse and productive hinterland, with a network of inland settlements offering diverse lifestyle options and close linkages to the sub-region's broad economic base. The Strategy supports the growth of these hinterland towns to reinforce their ongoing role in the settlement network.

New residents are attracted to the area by its economic opportunities, beautiful natural setting and strong communities. Together these characteristics comprise the enviable Bunbury-Geographe lifestyle.

The sub-region has been undergoing considerable change, and it has further capacity to grow and reach its potential as a population centre and economic area of strategic importance to Western Australia. The Strategy plans for a step change in the magnitude of Bunbury-Geographe's population and economy, in a manner that leverages the sub-region's strengths and maintains its uniqueness.

The Strategy has a time horizon of 2050 and can be used by any organisation or person seeking strategic guidance at a sub-regional scale on:

- land use planning and development in the Bunbury-Geographe sub-region
- the coordinated provision of infrastructure and/or services to accompany land development.

The Strategy is comprised of two main parts as follows:

Part A: Strategy

The key strategic content. Part A articulates a vision for the sub-region and identifies guiding principles and the strategic directions required to achieve that vision.

Part B: Profile

The supporting information. Part B profiles the sub-region's people and culture, population, urban settlement, utilities and services, environment, economy, and transport.

INTRODUCTION

Status

The *Bunbury-Geographe Sub-regional Strategy* (the Strategy) forms parts of the Western Australian planning framework under *State Planning Policy 1: State Planning Framework*.

The Strategy is a third-tier strategic planning document, as shown in Figure 1. It provides a clear line of sight between:

- the higher order *State Planning Strategy 2050* and *South West Regional Planning and Infrastructure Framework* of the Western Australian Planning Commission, and
- the local planning strategies of the respective local governments.

The Strategy therefore connects strategic planning at all tiers.

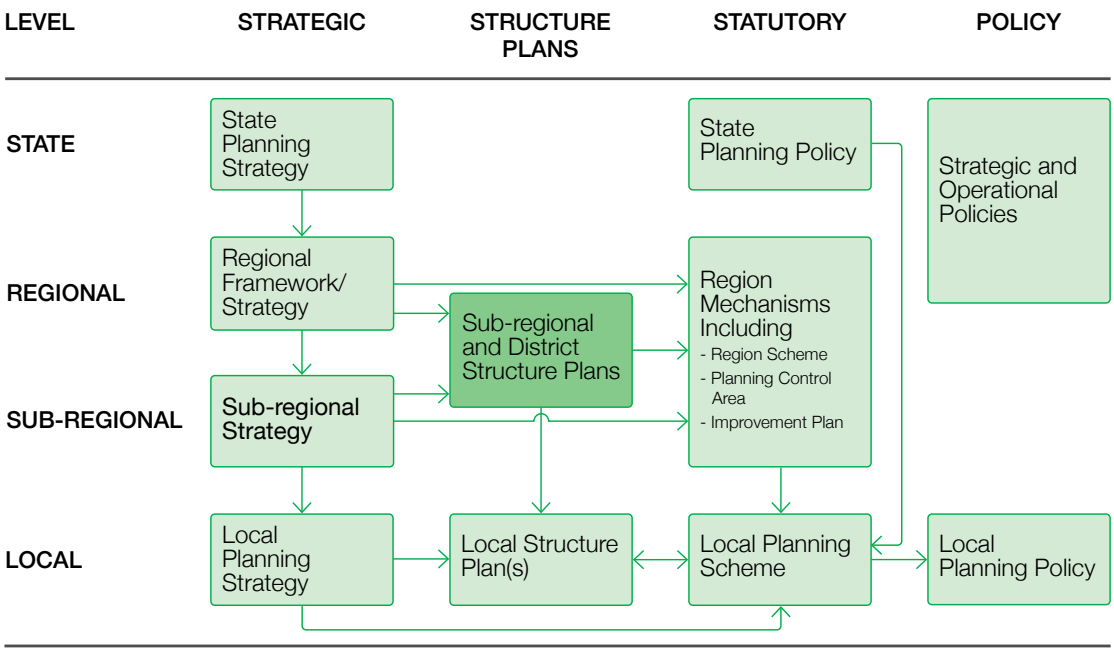
Strategy area

The Strategy applies to the following local government areas:

- City of Bunbury
- Shire of Dardanup
- Shire of Donnybrook-Balingup
- Shire of Capel
- Shire of Collie
- Shire of Harvey.

The name 'Bunbury-Wellington' has been used in the past for this sub-region. The Strategy uses the name Bunbury-Geographe to better reflect well-known geographic features of the area, such as Geographe Bay and the Geographe Wine Region.

Figure 1 – Western Australian Planning Framework



Purpose

The Western Australian Planning Commission's *State Planning Policy 1: State Planning Framework* establishes that sub-regional strategies guide change and provide a basis for cooperative action to be taken by the State and local governments on land use and development.

The primary purpose of this Strategy is to plan for and manage growth in the Bunbury-Geographe sub-region to the year 2050. It does this by:

- establishing a **vision to 2050** to guide land use planning, expressing an agreed aspiration for the future of the sub-region, in the context of the State Planning Framework
- identifying **strategic directions** and **actions** required to implement the vision
- reaffirming the **status of Bunbury** as the State's second city
- defining the sub-region's **settlement hierarchy**
- identifying future **land requirements** for residential and employment purposes
- providing a strategic context for local governments in preparing, reviewing and implementing **local planning frameworks**
- **profiling** the sub-region's urban settlements, transport networks, economy, environment and utilities/services.

Methodology

The Strategy was prepared by the Department of Planning, Lands and Heritage on behalf of the WAPC.

A Steering Group and five themed Working Groups were established to guide the preparation of the Strategy. The functions and membership of these groups can be seen in Appendix 1.

Development of the Strategy included:

- five Steering Group meetings, including a visioning workshop with an independent facilitator
- 14 Working Group meetings
- a strategic workshop with an independent facilitator attended by 85 Steering and Working Group members
- a bus tour of the sub-region for WAPC members.

The draft Strategy was advertised from November 2020 to February 2021. A total of 38 submissions were received.

Strategic workshop held at the Bunbury Dolphin Discovery Centre

Key planning issues

A profile of the sub-region is provided in Part B of the Strategy. The key land use planning issues for the sub-region identified in the profile are as follows:

Urban settlement

- The Bunbury Metropolitan Area is located across the City of Bunbury, Shire of Harvey, Shire of Dardanup and Shire of Capel. This gives rise to the need for coordinated strategic planning for the Bunbury Metropolitan Area across local government boundaries.
- The primacy of Perth over the rest of the State means that it attracts the majority of net interstate and overseas migrants to Western Australia. This poses a challenge for the population of Bunbury-Geographe to expand at the rate of growth that is desired.
- The feasibility of urban land development has been inhibited by low demand and high cost, relative to land values, of providing utility services and fill, especially in hinterland towns.
- The need to provide for diverse and affordable housing, while delivering a high quality of built form.
- The importance of conserving and enhancing the unique character, identity and sense of place of each settlement in the sub-region.

Economy

- Growth of the sub-region will require additional local employment through job creation.
- A number of factors, including fluctuating demand, technological advances and the reduction of carbon emissions are challenging some of Bunbury-Geographe's traditional industries including coal mining, energy generation, agriculture, retail and construction.
- Ensuring that land use planning supports implementation of the *Bunbury Geographe Regional Growth Plan* and the *Collie-Bunbury Economic Development Action Plan*.
- The need to support government initiatives to help Collie manage the transition away from coal-powered electricity generation by encouraging the diversification of the employment base and the economy.

Image courtesy Shire of Dardanup

Environment

- Balancing growth with the protection of areas with high biodiversity significance and other environmental values.
- The need to sustainably manage natural resources, including minimising fill on development sites and encouraging lightweight construction and alternative road construction materials and methods.
- The need to respond to the potential impacts of climate change, including a drying climate, reducing groundwater and surface water availability, and sea-level rise.
- Natural hazards (such as bushfire, coastal inundation/erosion and flooding) pose a risk to existing and future development.

Transport

- The need to integrate land use planning with long-term regional transport requirements.
- As the population and traffic congestion levels increase over time, particularly within the Bunbury Metropolitan Area, there is a need to provide a more effective and efficient public transport system that provides connectivity and builds linkages across the Bunbury Metropolitan Area, the wider sub-region and further afield.
- The importance of capturing opportunities provided by improved linkages with adjacent regions resulting from the Bunbury Outer Ring Road and improvements to Bussell Highway between Capel and Busselton.
- The opportunity for a fast passenger rail service connecting the Bunbury Metropolitan Area with Perth and Busselton, including an appropriate location for a railway station in the Bunbury Metropolitan Area.
- The need to plan for the efficient movement of freight from extraction sites to downstream processing and export facilities at Kemerton Strategic Industrial Area and the Port of Bunbury.

Utilities and services

- The sub-region's geographically dispersed settlement pattern, with a relatively small population spread across a number of settlements and sensitive environment, poses challenges for the efficient provision of infrastructure, utilities and services.
- Technological improvements offer the opportunity for flexible, innovative and alternative servicing solutions arrangements.
- The need to investigate and plan for alternative water sources and servicing strategies to meet long-term potable and non-potable water demands.

Image courtesy Shire of Dardanup

PART A STRATEGY

1. Vision

The vision for the Bunbury-Geographe sub-region is:

By 2050, Bunbury-Geographe will be internationally recognised as the home of Western Australia's second city, connected by an enviable lifestyle, diverse economy, unique natural environment and sustainable values.

The vision gives rise to the guiding principles, and serves as a target or goal when devising strategic directions and future actions.

2. Principles

The guiding principles for the Strategy are shown in Figure 2 – Strategy Table.

The principles guide the assessment of key issues and drive the formulation of the strategic directions listed in the following section. The Strategy Table shows the alignment between the principles and strategic directions.

3. Strategic directions

To support implementation of the State Planning Framework in the Bunbury-Geographe sub-region, the WAPC sets the strategic directions outlined in Figure 2 – Strategy Table to guide its planning activities for the sub-region.

The strategic directions state what is to be achieved or desired, and contribute to the achievement of the vision.

Where possible, the strategic directions are spatially or conceptually represented on the strategy map. Bolded text denotes where a strategic direction is directly referenced on the strategy map.

The strategic directions are organised into themes. The alignment between the principles and strategic directions can be seen in Figure 2 – Strategy Table.

Figure 2 – Strategy Table

THEME	PRINCIPLES	STRATEGIC DIRECTIONS
GROWTH	**Go beyond a business as usual approach to help the sub-region reach its full potential.** *A conscious step away from business as usual, seeking a deliberate step change that builds on the past but approaches the future differently, to provide a prosperous and sustainable future for Bunbury-Geographe*	1. Promote the **Bunbury Metropolitan Area as Western Australia's second city**, offering a range of employment and services as a genuine urban alternative to metropolitan Perth. 2. Provide for the growth of the sub-region's population to 200,000 by identifying sufficient residential and employment land to cater for this target population. 3. Recognise the broader aspiration for a population of 300,000 in the sub-region and respond to accelerated rates of growth by identifying additional residential and employment land, through regular monitoring and updating the Strategy as required.
	Establish an agreed and achievable pattern of growth across the sub-region. *Focusing growth in the larger settlements to maximise economic benefit and leverage existing infrastructure will help to ensure a sustainable future for the network of settlements that characterise the Bunbury-Geographe sub-region. Settlements will continue to be attractive places to live, with high amenity and access to services.*	4. Adopt the **settlement hierarchy** for the Bunbury-Geographe sub-region in Section 5. 5. **Promote the growth of the Bunbury Metropolitan Area as a Regional City** and the focus of major population and employment growth in the sub-region. 6. **Promote the growth of Collie** as a Sub-regional Centre by facilitating planning proposals that will help to diversify the employment base and provide for a smooth economic transition in the future. 7. **Support the growth of Major Towns and Towns** to reinforce their ongoing roles in the settlement network. 8. **Foster sustainable change in Villages** to support resilient communities. 9. Support proposals in Yarloop that assist in the redevelopment of the settlement following the 2016 Waroona-Yarloop Bushfire.
URBAN SETTLEMENT	**Promote a diverse urban form to cater for a range of lifestyle options and affordable housing choices.** *Lifestyle options and housing choice are at the heart of the Bunbury-Geographe lifestyle. Options include houses and units at varying densities and in a range of settings: inner urban, coastal suburban, hinterland towns and rural living. Promoting the offerings of a diverse urban form will maintain the Bunbury-Geographe lifestyle and retain the affordability benefits of living in regional Western Australia.*	10. Promote a consolidated urban form for the Bunbury Metropolitan Area through urban infill and increased residential densities around activity centres and other areas identified in a local planning strategy, while respecting heritage values and the distinctive character of each locality. 11. Support greenfield development in locations that have already been zoned or committed for residential purposes, and that are contiguous to existing urban areas with ready access to existing infrastructure and services. 12. Designate the **East Treendale Urban Expansion Area**. The extent of the East Treendale Urban Expansion Area is shown in Figure 7. 13. Designate the **Clifton Road Rural Living Precinct**. The extent of the Clifton Road Rural Living Precinct is shown in Figure 7. 14. Designate the **Treendale Road Rural Living Precinct**. The extent of the Treendale Road Rural Living Precinct is shown in Figure 7. 15. Provide for the designation of new rural living areas in locations contiguous with the following settlements: Collie, Donnybrook, Harvey, Balingup, Brunswick Junction, Dardanup, Allanson, Burekup, Cookernup, Kirup, Mullalyup, Roelands, Wokalup, Yarloop. Proposals for new rural living areas are to address the planning requirements for rural living precincts contained in *State Planning Policy 2.5: Rural Planning*. New rural living areas are to be designated in a local planning strategy and/or a local planning scheme. 16. Require local governments to use local planning strategies to review stocks of residential and employment land to identify and respond to opportunities and constraints.
	Promote alternative and innovative solutions. *Exploring alternatives, applying new technologies and embracing innovative solutions will help to address local challenges and opportunities.*	17. Support and encourage fit for purpose technology to deliver innovative waste management solutions which support the objectives and targets of the *Waste Authority's Waste Avoidance and Resource Recovery Strategy 2030*. 18. Support proponents of urban land developments to investigate alternative models of utility service delivery that provide a standard of service appropriate for the intended use, and that are capable of regulation by the Economic Regulatory Authority. 19. Encourage new developments, including those in infill areas, to be more waterwise and create climate resilient public open space, sporting grounds and recreational venues.

THEME	PRINCIPLES	STRATEGIC DIRECTIONS
ECONOMY	**Strengthen and diversify the economy.** *Bunbury-Geographe's economic strengths and competitive advantages make the sub-region poised for prosperity. Expanding the economy and pursuing opportunities based on emerging and existing strengths will make Bunbury-Geographe more attractive to potential investors and will drive diversity and adaptability.*	20. Adopt the activity centre hierarchy for the Greater Bunbury Region Scheme area in Section 6. 21. Require local governments to undertake activity centre planning in accordance with *State Planning Policy 4.2: Activity Centres*. 22. Ensure an adequate supply of industrial and commercial land across the sub-region to facilitate local employment. 23. Protect strategic basic raw materials in the sub-region from the encroachment of incompatible land uses that would restrict future extraction. 24. Undertake a study of the supply and demand of basic raw materials within the sub-region and the opportunities for alternative building construction techniques to reduce demand from the building and construction industries. 25. Facilitate the expansion and diversification of the tourism industry, and promote the flexibility of rural zones to accommodate rural-based tourism uses. 26. Support initiatives and investment in Kemerton Strategic Industrial Area and Shotts Strategic Industrial Area to make land project ready, and facilitate proposals in accordance with relevant planning instruments. 27. Retain identified light and general industrial areas for industrial use and protect from the encroachment of sensitive land uses. 28. Protect priority agricultural land from incompatible land uses. 29. Support expansion of the Bunbury Port and the establishment of an intermodal freight hub facility in the Waterloo industrial area, or another suitable location that has direct access to inter-regional road and rail infrastructure.
ENVIRONMENT	**Consider and respond to the implications of climate change.** *Appropriately identifying and managing climate impacts and risks will enhance the climate resilience of Bunbury-Geographe. Promoting and supporting emission reduction outcomes for the sub-region will reduce its contribution to global climate change.*	30. Recognise potential impacts and opportunities arising from climate change and initiatives to reduce greenhouse gas emissions in planning instruments.
	Protect and enhance environmental values in the context of climate change. *Bunbury-Geographe's natural setting is a key component of the sub-region's liveability, attracting visitors as well as supporting community wellbeing. Protecting and enhancing the many valued natural assets will ensure best outcomes for the sub-region's environment, economy and community.*	31. Require planning instruments to identify and **protect, manage and enhance environmental assets** such as forests, rivers, estuaries, coastlines and areas of remnant vegetation. 32. Focus the growth of settlements in locations where impacts on natural resources and the environment are minimised. 33. Preserve and enhance ecological linkages, including a presumption against further fragmentation of these linkages, in planning instruments. 34. Require local governments to use local planning strategies to identify and protect significant visual landscapes.
	Protect people and property from natural hazards. *Appropriately managing the risk posed to settlements by natural hazards will protect life and livelihood.*	35. Adopt a presumption against planning proposals within areas identified to be affected by coastal hazards and flooding. 36. Support intensification of land use only where bushfire risk can be understood to be low and/or capable of being appropriately mitigated without adversely impacting biodiversity conservation.

THEME	PRINCIPLES	STRATEGIC DIRECTIONS
TRANSPORT	**Improve transport connections within the sub-region and to adjoining areas.** *Bunbury-Geographe is strategically positioned as the gateway to the South West. Enhancing transport connectivity will reinforce existing linkages within the sub-region and redefine cross-regional relationships between Bunbury-Geographe and surrounding areas.*	37. Support initiatives to connect and link the Bunbury Metropolitan Area to the hinterland settlements to create an **integrated network**, including public transport and regional bike network connection. 38. Retain the **Australind railway reserve** and collaborate with State Government agencies on the potential relocation of the terminus to central Bunbury. 39. Collaborate with State Government agencies on planning for a potential **fast passenger rail** connecting Perth and the South West region, including securing a corridor in appropriate planning instruments. 40. Support increasing the capacity of the existing **freight rail network** and future strategic freight rail alignments. 41. Promote the sub-region's **tourist routes** in planning instruments. 42. Support improvements to the **road and rail access to Bunbury Port** and respond to any changes to the local and sub-regional transport network resulting from the expansion of the Port.
UTILITIES AND SERVICES	**Ensure sustainable regional outcomes by coordinating the provision of infrastructure to support growth.** *The fair and equitable provision of infrastructure is key to communities remaining connected, sustainable and vibrant. The planning, upgrading and/or provision of new infrastructure across the sub-region to both stimulate growth and meet demand will help to ensure sustainable outcomes for Bunbury-Geographe.*	43. Direct future urban growth to locations that are well serviced by existing infrastructure networks. 44. Support the provision of sufficient utility, transport, health, education, and community infrastructure/services to cater for a growing population and economy across the sub-region. 45. Support the delivery of infrastructure projects and regulatory process improvements identified by the Industrial Lands Authority and Infrastructure WA. 46. Support measures to improve water efficiency and re-use of grey water where appropriate. 47. Collaborate with infrastructure providers to audit current capacity of electricity, water and wastewater infrastructure to help quantify existing growth capacity and thresholds for upgrades, and to develop servicing strategies to meet long-term potable and non-potable water demands.
LIFESTYLE	**Retain, protect and leverage the sub-regional character and the Bunbury-Geographe lifestyle.** *The character and lifestyle of Bunbury-Geographe are defining factors that set the sub-region apart from other areas, and are critical in attracting and retaining residents. Growth will be carefully managed to capitalise upon and ensure key features of character, diversity of housing choice and lifestyle are not lost.*	48. Encourage local governments to protect local character by preparing and implementing design standards that require new development in existing urban areas to maintain and improve the streetscape and amenity of the locality. This can include the use of local planning schemes to vary the requirements of the R-Codes. 49. Collaborate with local governments to undertake/review local heritage surveys, and designate heritage lists and/or areas. 50. Engage with Gnaarla Karla Boodja Regional Corporation (proposed), South West Boojarah Regional Corporation (proposed) and Aboriginal heritage knowledge holders as stakeholders in the land use planning process.

In the matter of:	**an application for review which the Minister for Planning has called-in and decided to determine**
Pursuant to:	**the *Planning and Development Act 2005*, sections 246 and 247**
Formerly:	**State Administrative Tribunal proceeding DR 63 of 2022**
Applicant:	**B & J Catalano Pty Ltd**
Respondent:	**Shire of Harvey**
Relating to:	**a proposed extractive industry Lot 7 Runnymede Road, Wellesley**

WITNESS STATEMENT OF MICHAEL JUST FORMING PART OF MATERIALS SUBMITTED ON BEHALF OF THE RESPONDENT

Introduction

1. My full name is Michael Peter Just.

2. My address is 44 Macarthur Avenue, Padbury, 6025, Western Australia.

3. I have been engaged by the respondent to undertake a desktop review of a vegetation and flora report that was submitted by the applicant in this appeal, to the Shire of Harvey, in support of the applicant's application for development approval and an extractive industry licence on a portion of Lot 7 Runnyemde Road, Wellesley.

4. I understand that my witness statement will be considered as expert evidence in this appeal.

My background and curriculum vitae

5. I have worked within Banksia woodlands and other vegetation types over the past 9 years as part of my undergraduate, masters and doctoral degrees, and currently to work with these vegetation communities in a professional capacity.

6. My curriculum vitae is **Attachment MPJ 1** to this statement.

The Lundstrom 2019 report

7. A flora and vegetation survey was commissioned by the applicant in September 2018 on a 16ha portion which includes most of the 1.17ha area the subject of this application. The survey report is '*Flora and Vegetation Survey Report (v0.2) Lot 7*

Runnyemde Road, Wellesley' by Lundstrom Environmental Consultants, dated 19 March 2019, **(Lundstrom 2019)**. It was issued in March 2019 based on September 2018 inspections.

8. I have been provided by McLeods, lawyers for the Shire, with a document which overlays the appeal area onto Figure 9 of the Lundstrom Report. By 'appeal area', I mean the area which the applicant wants to extend its extraction activities into, which is what is being applied for in the application to the Shire and in this appeal. The superimposition onto Figure 9, is **Attachment MPJ 2** to this statement. Attachment MPJ 2 shows the areas identified by Lundstrom Consultants as 'Excellent', 'Very Good', 'Good' and 'Degraded' vegetation condition within the appeal site. Attachment MPJ 2 does not show cadastral boundaries. The purple lines are the boundaries of the Lundstrom Flora Report study area, not the cadastral boundaries.

9. **Attachment MPJ 2** shows that there is a portion of the western part of the appeal area which was not the subject of the Lundstrom Flora Report. I am informed by McLeods that no vegetation and flora report has been presented to the Shire at this time, which deals with that western-most part of the appeal area.

10. I now set out my opinions based on the requested desktop review of the Lundstrom Flora Report.

Whether appeal site is a 'patch' in its own right, or part of a 'patch'

11. **Attachment MPJ 2** shows that the majority of the appeal site, if looked at in isolation, is of 'good' vegetation quality. Some of it is 'degraded'. Small portions at the edges are 'very good' or 'excellent'.

12. The western-most section of the appeal site was not covered by the Lundstrom investigation and therefore not reported on in Lundstrom 2019. It predominantly has tree cover and is not cleared or pasture as the majority of the 'degraded' section is. However that comment is not a substitute for a proper vegetation assessment. My point is that there is no sufficient basis to say that the unsurveyed portion is 'degraded', and given that it is part of a larger area the working assumption should be that it is at least 'good'.

13. In my opinion, it is not consistent with the relevant Conservation Advice under the EPBC Act, to assess the appeal site in isolation as to whether it is a Threatened Ecological Community. I refer to the section 266B "*Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community*" dated 16 September 2016, particularly paragraph 2.2.4 as follows:

> '... *A patch is a discrete and mostly continuous area of the ecological community. A patch may include small-scale (<30 m) variations, gaps and disturbances*, such as tracks, paths or breaks (including exposed soil, leaf litter, cryptogams and watercourses/drainage lines), *or localised variations in vegetation that do not significantly alter the overall functionality of the ecological community. Such breaks are generally included in patch size calculations*. Where there is a break in native vegetation cover, from the edge of the tree canopy of 30 m or more (e.g. due to permanent artificial structures, wide roads or other barriers; or due to water bodies typically more than 30m wide) then the gap typically indicates that separate patches are present.
>
> *Variation in canopy cover, quality or condition of vegetation across a patch should not initially be considered to be evidence of multiple patches. Patches*

> *can be spatially variable and are often characterised by one or more areas within a patch that meet the key diagnostic characteristics and condition threshold criteria amongst areas of lower condition*. *Average canopy cover and quality across the broadest area that meets the general description of the ecological community should be used initially in determining overall canopy cover and vegetation condition*. Also note any areas that are either significantly higher or lower in quality, gaps in canopy cover and the condition categories that would apply across different parts of the site respectively. Where the average canopy cover or quality falls below the minimum thresholds, the next largest area or areas that meet key diagnostics (including minimum canopy cover requirements) and minimum condition thresholds should be specified and protected. This may result in multiple patches being identified within the overall area first considered.
>
> *The Banksia Woodlands ecological community is highly diverse and variable. Composition often changes across a patch*, but structure and presence of a significant Banksia component are unifying features...'.

14. The proposed extension EIL area seeks to clear 1.17ha of predominantly "good" quality vegetation comprised of primarily of *Eucalyptus marginata, Banksia attenuata, Corymbia calophylla* occurring within a 16ha patch of primarily "excellent" condition vegetation. The 1.17 ha appeal site is part of a larger patch in that it is part of the 16ha patch which is "a discrete and mostly continuous area of the ecological community". The above-quoted guidance indicates that the predominant condition of the overall patch is generally to be taken as defining the quality of the patch as a whole, which in the present case is "excellent".

15. **Attachment MPJ 2** and also Figure 9 of **Lundstrom 2019** do not show any discontinuities of 30 metres or more that should be regarded as separating the appeal site from the rest of the patch.

16. The findings of the **Lundstrom 2019** report (see particularly Figure 9) indicate that the vegetation within the 16ha patch, including the 1.17ha extension EIL area, is consistent with the Commonwealth EPBC Act listed Banksia Woodlands Threatened Ecological Community (TEC) and warrants protection under the EPCA Act.

17. The main implications of this in terms of the Approved Conservation Advice, is that paragraph 5.2.1 of that Advice comes into play, whereby the highest relevant priority is:

> Prevent further clearance, fragmentation or detrimental modification of remnants of the ecological community and of surrounding native vegetation, for example, during residential development, basic raw materials extraction, and associated infrastructure development. High conservation value, unmodified and older growth areas are particularly important for retention and management.

Further detailed aspects of that priority are set out as part of paragraph 5.2.1.

Buffer zone

18. The relevant Conservation Advice made under EPBC Act section 266B (p.34) also recommends a buffer zone of between 20-50m from the outer edge of a patch to help protect and manage the national threatened ecological community. The edges of a patch are considered particularly susceptible to disturbance and the presence of a

buffer zone is intended to act as a barrier to further direct disturbance.

19. The current lack of a buffer to the North and East of the proposed site has likely impacted the quality of vegetation, potentially leading to the degradation of the north-east corner to its current "good" quality. The current proposed extension area will clear not only half of the TEC considered "good" quality, and a small portion of "very good" and "excellent" vegetation but will also bring clearing immediately adjacent to areas designated as "very good" and "excellent" condition.

Priority flora

20. Three Priority flora, as listed by DBCA, were recorded in the Survey Area (Lundstrom 2019, p.22 section 4.2.2). However, proper identification of two species (*Lasiopetalum* and *Millotia*) was not possible at the time of the survey, and a stated assumption was made as to which precise species of *Lasiopetalum* and *Millotia* were present. Those assumed species are Priority 2 and 3 respectively.

21. However because the precise species could not be identified with certainty, it is possible that the species actually present are of a greater conservation status than what is listed within **Lundstrom 2019**. I explain this further as follows. Twenty-nine of the 50 species of *Lasiopetalum* currently possess conservation status, including three species listed as threatened, and 8 of the 17 species of *Millotia* currently possess conservation status. Due to the high proportion of conservation significant species that occurs within *Lasiopetalum* and *Millotia* it is recommended that further identification of these species is carried out to ensure those present within the appeal area are not of greater conservation status than what is listed within the Lundstrom report.

22. Further, due to the long unburnt status of the 16 ha patch (**Lundstrom 2019, p.24 section 4.3.5**), it is likely that the soil profile possesses a soil-seed bank capable of significant regeneration post-fire. Following fire, species of conservation significance may emerge as having a wider distribution throughout the 16 ha patch than the Lundstrom 2019 report indicated – including the appeal area.

Endangered fauna

23. This habitat Banksia woodlands of the Swan Coastal Plain have been identified as the primary foraging and feeding habitat for the endangered Carnaby's Cockatoo (**Department of Environment and Conservation, 2012**), see **Attachment MPJ 3**. The Carnaby's Cockatoo (*Calyptorhynchus latirostris*) has lost approximately 87% of its habitat since European (**Department of Environment and Conservation, 2012**). Critical to the ongoing survival of the Carnaby's Cockatoo is the preservation of TECs that can support their breeding and feeding habitats, such as the area encompassed within the appeal site (**Lundstrom 2019**).

Michael Just

18 July 2022

Cited information:

Department of Environment and Conservation. "Carnaby's Cockatoo (Calyptorhynchus latirostris) recovery plan." (2012): 12-21.

Lundstrom Environmental Consultants Pty Ltd (2019) Lot 7 Runnymede Rd, Wellesley Flora and Vegetation Survey Report. Prepared by Lundstrom Environmental Consultants Pty Ltd for B&J Catalano Pty Ltd.

ATTACHMENT MPJ 1

Michael Just

Curtin University

+61 0400 906 298
michael.just@curtin.edu.au
@m_just_
Michael Just

Education

Doctor of Philosophy - Curtin University, Perth Western Australia 2018-2022
School of Molecular Life Sciences
Supervisors: Dr. Adam Cross, Dr. Shane Turner, Dr. David Merritt, Prof. Kingsley Dixon.
Thesis: Intractable seed dormancy limits biodiversity in restoration, a focus on Southwest Australia Rutaceae

Master of Science, - Edith Cowan University, Perth Western Australia 2015-2018
Centre for ecosystems management
Supervisors: Dr. Kristina Lemon, Dr. Katherine Downes, Prof. Will Stock
Thesis: The seed morphology, dormancy, and germination of Western Australia Ericaceae

Bachelor of Science - Edith Cowan University, Perth Western Australia 2011-2014
Centre for ecosystems management

Publications

Turner, S.R., Cross, A.T., **Just, M.P,** Newton, V., Pedrini, S., Tomlinson, S. and Dixon, K., 2022. Restoration seedbanks for mined land restoration. Restoration Ecology, p.e13667.

Just, M.P, Merritt, D.J., Turner, S.R., Conran, J.G. and Cross, A.T., 2019. Seed germination biology of the Albany pitcher plant, Cephalotus follicularis. *Australian Journal of Botany*, *67*(7), pp.480-489.

Presentations and outreach

The Biodiversity Conference Resilient Landscapes, Perth, Western Australia, Sept 15-17th, 2021
Just, M. et al 2021. Seed dormancy limits biodiverse restoration: An investigation of a notoriously intractable plant family, the Rutaceae

ARC Centre for Mine Site Restoration Practitioner Workshop, Perth, Western Australia, May 15th, 2021
Pedrini, S., …, **Just, M.**, 2021. Seeds in mine-site restoration: Breaking down the native seed supply chain from sourcing to pelleting.

Society for Ecological Restoration Conference, Darwin, Western Australia, May 10-13, 2021
Just, M. et al 2021 Seed dormancy and germination of Intractable Rutaceae in Western Australia.
Hosted symposia: Pedrini, S., …, **Just, M.**, 2021. *Seeds*.

BHP iPrep Research Engagement Program, Perth, Western Australia, April 7th, 2021
Just, M. et al 2021. Measuring Residual Impact on Biodiversity Values

ARC Centre for Mine Site Restoration Annual workshop, Perth, Western Australia, 6-7th Nov 2019
Just, M. et al 2019. Seed development, dormancy, and germination of intractable Rutaceae

Society for Ecological Restoration Conference, Brisbane, Western Australia, September 7-10, 2018
Just, M. et al 2019. Seed dormancy and germination of Intractable Ericaceae in Western Australia.

Research Matters, Newsletter of the Australian Flora Foundation No. 29, January 2019
Just, M. 2019. Dormancy and germination in West Australian Ericaceae

ARC Centre for Mine Site Restoration Annual workshop, Perth, Western Australia, 19-20th Nov 2018
Just, M. et al 2018. Seed development, dormancy, and germination of intractable Rutaceae

Awards and funding

HDR Research Stipend Scholarship
ARC Centre for Mine Site Restoration - In Kind Funding
iPrep WA BHP Internship Scholarship
HDR Completion Scholarship
Registration Grant – Biodiversity Conference 2021
Conference Attendance Grant – ARC CMSR
Project Seeding: Orchid Conservation Initiative
Wildflower Society of Western Australia

Service roles

Research Assistant: Centre for marine ecosystems management, ECU	2017
Research Assistant: Centre for ecosystems management, ECU	2017-2021
Technical Assistant: School of molecular and Life science, Curtin	2018-2021
Technician: School of molecular and Life science, Curtin	2019
Lab Manager: ARC Centre for Mine Site Restoration, Curtin	2018-2020

Certifications and

Analytical
R computing language
Spatial analysis (ArcGIS & QGIS)
Microsoft suite of softwares
Adobe Photoshop & Illustrator
SigmaPlot
SPSS

Interpersonal
Workshop organization
Creating networks and collaborations
Science communication
Public speaking
Meeting chair

Field/Lab Skills
Senior First Aid (Certified)
Off-road driving (Certified)
Health & Safety (Certified)
Seed collection
Germination testing
Seed viability testing
Vegetation surveys
Remote sensing
Seed enablement
Sterile technique
Tissue culture
Scanning Electron Microscopy

Board Experience

Society for Ecological Restoration Australasia, Secretary
2018-Present
- Scheduling monthly meetings
- Maintaining and engaging over 300 society members
- Preparing annual reports and managing annual elections

Teaching Experience

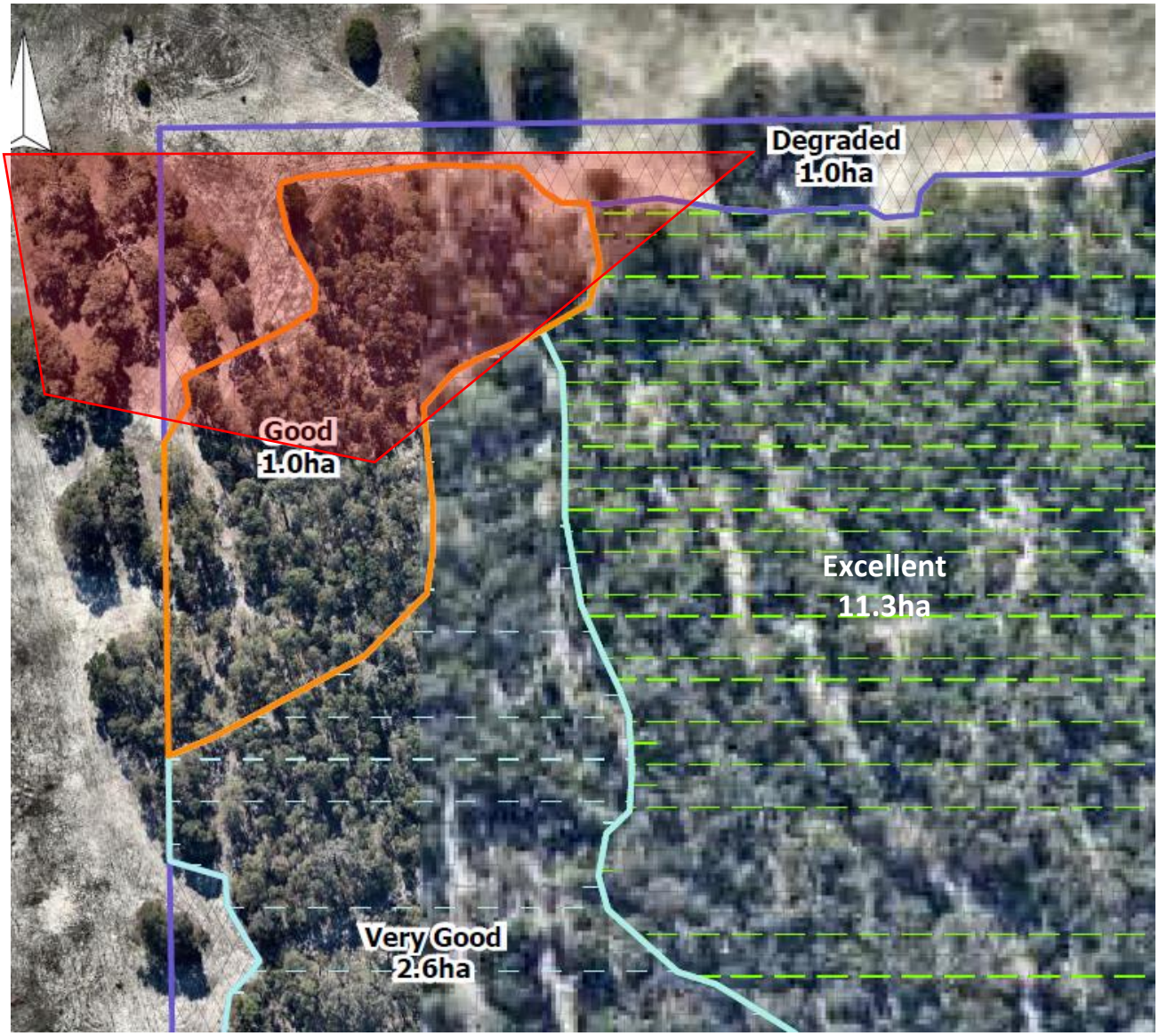
Sessional Academic 2018-2022
- Foundations in Biology, Workshops, Laboratories, Report Marking, Exam Marking
- Functional Biology, Workshops, Laboratories, Report Marking, Exam Marking
- Cellular Biology, Workshops, Laboratories, Report Marking, Exam Marking
- Behavioural Ecology, Laboratories

Supervisory Experience

Bradley Albert, Honours Student, Curtin University (2021-2022)
Sophie Johnstone, SAE integrated Learning Student, Curtin University (March- August 2021)
Christabel Khoo, Honours student, Curtin University, 2020

ATTACHMENT MPJ 2

Lot 7 Runnymede (A002575/EX/004)
Approximate proposed extension area overlayed onto vegetation survey



- Red polygon equates to the proposed EIL extension area.
- Purple outline equates to the survey area of Lundstrom Flora and Vegetation Survey report.
- Cadastral boundaries are not shown on this plan.

Carnaby's Cockatoo *(Calyptorhynchus latirostris)*

Recovery Plan

Western Australian Wildlife Management Program No. 52

Department of Parks and Wildlife

October 2013

Department of Parks and Wildlife

Australian Government

WESTERN AUSTRALIAN WILDLIFE MANAGEMENT PROGRAM NO. 52

Carnaby's Cockatoo *(Calyptorhynchus latirostris)*

Recovery Plan

October 2013

Department of Parks and Wildlife
Locked Bag 104, Bentley Delivery Centre, Perth, WA 6983

FOREWORD

This is a Recovery Plan prepared within the framework laid down in Department of Parks and Wildlife (DPaW) Policy Statements Numbers 44 and 50 (CALM 1992; CALM 1994), and the Australian Government Department for Sustainability, Environment, Water, Population and Communities (SEWPAC) Recovery Planning Compliance Checklist for Legislative and Process Requirements (DEWHA 2008), with the assistance of funding provided by the Australian Government.

Recovery Plans outline the recovery actions that are required to address those threatening processes most affecting the ongoing survival of threatened taxa or ecological communities, and begin the recovery process. Recovery Plans delineate, justify and schedule management actions necessary to support the recovery of threatened species and ecological communities. This Recovery Plan has been developed with the involvement and cooperation of a range of stakeholders, but individual stakeholders have not necessarily committed to undertaking specific actions. The attainment of objectives and the provision of funds may be subject to budgetary and other constraints affecting the parties involved. Proposed actions may be subject to modification over the life of the plan due to changes in knowledge.

Information in this Recovery Plan was accurate at October 2013.

Recovery Plan Preparation: This Recovery Plan was originally prepared by J. Goldberg, K. Bleby and P. Mawson.

Citation: Department of Parks and Wildlife (2013). Carnaby's cockatoo (*Calyptorhynchus latirostris*) Recovery Plan. Department of Parks and Wildlife, Perth, Western Australia.

Cover photograph: Female Carnaby's cockatoo *Calyptorhynchus latirostris* (Rick Dawson, Department of Parks and Wildlife).

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ABBREVIATIONS

APV	Avian polyomavirus
BFDV	Beak and feather disease virus
CALM	Department of Conservation and Land Management, Western Australia; currently DPaW
CITES	Convention on International Trade in Endangered Species
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEC	Department of Environment and Conservation, Western Australia, formerly CALM, currently DPaW
DAFWA	Department of Agriculture and Food, Western Australia
DEWHA	Department of Environment, Water, Heritage and Arts; currently SEWPAC
DPaW	Department of Parks and Wildlife, Western Australia, formerly DEC
EPA	Environmental Protection Authority, Western Australia
EPBC Act	Environment Protection and Biodiversity Conservation Act (1999)
IOCI	Indian Ocean Climate Initiative Panel
SEWPAC	Department of Sustainability, Environment, Water, Population and Communities, formerly DEWHA
WA	Western Australia
WAPC	Western Australian Planning Commission

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Past and present members of Carnaby's cockatoo Recovery Team have contributed significantly to the development of this Plan. Dr Kristin Warren, Dr Carly Holyoake, Dr Anna Le Souef and Simone Vitali provided information and suggestions on disease and associated impacts. Chris Phillips and Denis Saunders provided comments on drafts. Funding was provided by SEWPAC and the State NRM program.

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SUMMARY

Species: Carnaby's cockatoo *Calyptorhynchus latirostris* Carnaby 1948

Family: Psittacidae

DPaW Regions: Midwest, South Coast, South West, Swan, Warren and Wheatbelt Regions

Interim Biogeographic Regions: Avon Wheatbelt, Esperance Plains, Geraldton Sandplains, Jarrah Forest, Swan Coastal Plain, Warren, Yalgoo

Current status of taxon: Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*: Endangered (EN)

Western Australian *Wildlife Conservation Act 1950*: Rare or likely to become extinct

Habitat critical for survival:

Habitat critical to survival for Carnaby's cockatoos can be summarized as:

- The eucalypt woodlands that provide nest hollows used for breeding, together with nearby vegetation that provides feeding, roosting and watering habitat that supports successful breeding;
- Woodland sites known to have supported breeding in the past and which could be used in the future, provided adequate nearby food and/or water resources are available or are re-established;
- In the non-breeding season the vegetation that provides food resources as well as the sites for nearby watering and night roosting that enable the cockatoos to effectively utilise the available food resources.

Recovery Objective:

To stop further decline in the distribution and abundance of Carnaby's cockatoo by protecting the birds throughout their life stages and enhancing habitat critical for survival throughout their breeding and non-breeding range, ensuring that the reproductive capacity of the species remains stable or increases.

Performance Criteria:

This Recovery Plan will be deemed completely successful if, within a ten year period, all of the following are achieved:

- The species' area of occupancy does not decline. In the absence of any improved methods this will be measured by the same method used, and compared with the values calculated, in this Recovery Plan: 60,525 km^2 using a grid size of 15 x 15 km. (The measure of the area of occupancy may be upgraded during the life of the plan provided the benchmark established here is not substantially changed under the replacement system.)
- The number of breeding pairs of Carnaby's cockatoos at pre-determined (and recorded in advance) breeding sites across the breeding range remains stable or increases, averaged over three consecutive years. (Any changes in the breeding sites counted for this measure are to be approved by the DPaW Director, Nature Conservation and to remain statistically comparable with sites used at the commencement of this plan.)
- Estimates of the number of birds and proportion of juveniles across the entirety of known (standardised) night roost sites across the range of the species remains stable or increases, averaged over three consecutive years.
- The extent of nesting habitat (trees with nesting hollows), feeding habitat (as defined by vegetation complexes or suitable revegetation), and night roosting habitat (as identified through community survey) are maintained throughout the species range.

This Recovery Plan will be deemed to not be successful if, within a ten year period, any of the following occur:

- The area of occupancy declines by more than 10% below 60,525 km^2 using a grid size of 15 x 15 km^2 (or similar change in amended methodology).
- The number of breeding pairs of Carnaby's cockatoos at monitored breeding sites across the breeding range decreases by more than 10% averaged over three consecutive years.
- The estimated number of adult and proportion of juvenile Carnaby's cockatoos at known night roost sites decreases by more than 10% averaged over three consecutive years.
- The extent of nesting habitat (trees with nesting hollows), feeding habitat (as defined by vegetation complexes), and night roosting habitat (as identified through community survey) decreases by more than10% throughout the species range.

Recovery Actions:

There are six broad themes to the recovery actions:

1. Protect and Manage Important Habitat
Identify, protect and manage habitat critical for survival (nesting, foraging and roosting) for Carnaby's cockatoos across their breeding and non-breeding range.

2. Undertake Regular Monitoring
Monitor population parameters, habitat, threats and status of the Carnaby's cockatoo.

3. Conduct Research to Inform Management
Undertake research into the biology, ecology, and conservation management of Carnaby's cockatoo.

4. Manage Other Impacts
Monitor the impacts and implement strategies to reduce other factors detrimentally affecting Carnaby's cockatoos, and support rehabilitation programs.

5. Engage with the Broader Community
Engage with and involve people across the community in the conservation of Carnaby's cockatoo.

6. Undertake Information and Communication Activities
Develop and distribute awareness raising and guidance materials for decision makers, establish joint management agreements and provide for improved sharing of information between agencies.

Recovery Team:

Recovery Teams provide advice and assist in coordinating actions described in recovery plans. Recovery teams include representatives from organisations with direct interest in the recovery of the species, including those involved in funding, carrying out or helping to carry out actions that support the recovery of the species. The Carnaby's Cockatoo Recovery Team was first established in 1999 to coordinate the recovery of the species and the development and implementation of the initial recovery plan (Cale 2003). Originally the team comprised of representatives from DPaW, CSIRO, WA Museum, Perth Zoo, BirdLife Australia and a private landowner. Over time other organisations and individuals have been invited to join the team or to share their expertise, experience and knowledge with the recovery team.

Cost:

The estimated cost of implementing this Recovery Plan is $7,730,000 over ten years. However, this estimated figure does not include costs associated with the ongoing management of habitat by DPaW, other government agencies and private land owners, or all the costs associated with the creation of new habitat, and the re-creation of habitat lost to clearing. No does it include costs associated with mitigating any loss of habitat due to development proposals that may be approved and undertaken at any point in the next 10 years. It should also be noted that volunteers undertake a great deal of work associated with the recovery of this species which is not reflected in the estimated implementation costs.

1 INTRODUCTION

Carnaby's cockatoo (*Calyptorhynchus latirostris*) is one of the five Australian endemic black cockatoo species, and one of two species of white-tailed black cockatoo. Carnaby's cockatoo was once very numerous in Western Australia. Since the late 1940s the species has suffered a 30% contraction in range, a 50% decline in population, and between 1968 and 1990 disappeared from more than a third of its breeding range (Saunders 1990; Johnstone and Storr 1998; Saunders and Ingram 1998; Garnett *et al*. 2011).

The decline of Carnaby's cockatoo has been due primarily to the loss and fragmentation of habitat, as a result of clearing of native vegetation, since the middle of the 20th century (Saunders 1979b, 1980, 1986, 1990; Saunders and Ingram 1987, 1995, 1998; Saunders *et al*. 1985; Mawson and Johnstone 1997). Approximately 56% (over 2 million hectares) of the species' habitat has been cleared since European settlement (DEC unpublished data 2010). As a result of historical and current threats, Carnaby's cockatoo has undergone a major decline in range, particularly in drier areas and the central wheatbelt (Saunders 1990; Johnstone and Storr 1998).

This recovery plan covers the ten year period from 2012 and provides some background information on Carnaby's cockatoo, threatening processes that affect this species, and identifies the recovery objective, success criteria and the actions required over the next ten years to progress towards the longer term recovery of this species.

2 SPECIES INFORMATION

2.1 History and Taxonomic Relationships

Carnaby's cockatoo was first described as a subspecies of Baudin's cockatoo by Ivan Carnaby in 1948 (*Calyptorhynchus baudinii latirostris*; Carnaby 1948). In 1979 it was separated from *C. baudinii* and treated as a subspecies of the yellow-tailed black cockatoo (*C. funereus latirostris*; Saunders 1979a). Since the 1970s it has been conventional to regard *C. latirostris* and *C. baudinii* as two separate species based on morphology, vocalisations, behaviour and ecology (Campbell and Saunders 1976; Johnstone and Storr 1998; Johnstone 2001; Cameron 2007). The current taxonomic arrangement based on the Western Australian Museum State Checklist (Johnstone 2001), is *Calyptorhynchus latirostris* Carnaby, 1948 Carnaby's cockatoo, and *Calyptorhynchus baudinii* Lear, 1832 Baudin's cockatoo.

As a result of the early taxonomic history some historical records can be difficult to assign with certainty to Carnaby's cockatoo.

Recent genetic analysis has found that although the two white-tailed black cockatoos are highly distinct from the yellow-tailed black cockatoos, Carnaby's and Baudin's cockatoos may not be reliably distinguished with the markers used (White *et al.* 2011a; White 2012). Notwithstanding this relative genetic similarity, Carnaby's cockatoo is a recognisable morphologically, behaviourally and ecologically distinct entity and this recovery plan deals with the recovery of that distinct entity.

2.2 Description

Carnaby's cockatoo is a large, mostly black bird with white cheek patches, large white panels on the tail and a strong curved bill. Adults range from 53-58 cm in length and 520-790 g in weight (Saunders 1974; Johnstone and Storr 1998), with a wingspan approximately 100 cm (Higgins 1999). The body feathers are brownish-black or greyish-black in colour and narrowly edged with dull white, giving them a scalloped appearance. In both sexes the iris is dark brown or reddish-brown, and the bill has a flaky texture. Females differ from males in having a light grey bill, blue-grey eye-ring and a large distinctive cheek patch; males have a black bill, a pink eye-ring and a comparatively smaller and duller cheek patch. Immature male birds look similar to adult females, but their bills are smooth and duller in colour and begin to darken in the birds' third year. Both Carnaby's cockatoo and Baudin's cockatoo have distinctive wailing 'Wy-lah' calls, which consist of four segments, but is more drawn out in Carnaby's cockatoo and can be distinguished in the field by experienced observers (Saunders 1979b; Higgins 1999; Johnstone and Storr 1998).

2.3 Distribution, Habitat and Movements

Carnaby's cockatoo is endemic to the south-west of Western Australia, with a widespread distribution (Figure 1). The species is highly mobile and displays a seasonal migratory pattern that is linked to breeding (Saunders 1980, 1990; Berry 2008). Breeding takes place between late July and December and most breeding occurs in the inland parts of its distribution, in areas receiving between 300 and 750 mm of annual average rainfall (Saunders 1974). During the non-breeding season (January to July) the majority of the birds move to the higher rainfall coastal regions of their range including the midwest coast, Swan Coastal Plain and south coast (Saunders 1980, 1990; Berry 2008; Saunders *et al.* 2011b; Johnstone *et al.* 2011) (Figure 2).

There are a number of resident populations throughout the species range that do not show breeding migration but remain close to their breeding sites year round (e.g. Jarrah forests from Mundaring to Nannup, Hopetoun, Perth and Peel region (Johnstone and Storr, 1998; Johnstone *et al.* 2011; Raana Scott, BirdLife Australia, *pers. comm*. 2012)). There has been an apparent expansion in the breeding range to include areas further west and south since the middle of last century with a more rapid increase in the past 10-30 years into the Jarrah-Marri forests and the coastal tuart forests south of Perth (Johnstone and Storr 1998; Johnstone *et al.* 2011).

Carnaby's cockatoo has suffered at least a 50% decline in the total population and has disappeared from more than a third of its breeding range between 1968 and 1990 (Saunders and Ingram 1998). The total population of Carnaby's cockatoo in the 1980s was estimated at between 11,000 and 60,000 birds (Saunders *et al*. 1985), although the population in 2010 was considered to be around 40,000 birds (Peter Mawson, DEC, *pers. comm.* 2010). Though there is some indication that genetic structuring is becoming evident within the population from east to west, likely due to the fragmented nature of the species' distribution, the Carnaby's cockatoo is still considered as one large interconnected population (White 2012).

A preliminary analysis of reporting rates between the first national Bird Atlas (1977 to 1981; Atlas 1; Blakers *et al.* 1984) and second Atlas (1998 – 2002; Atlas 2; Barrett *et al.* 2003) identified a 46% decline in reporting rate (index of abundance) for Carnaby's cockatoos in the northern part of their range (G. Barrett, DEC, *pers. comm*. 2011).

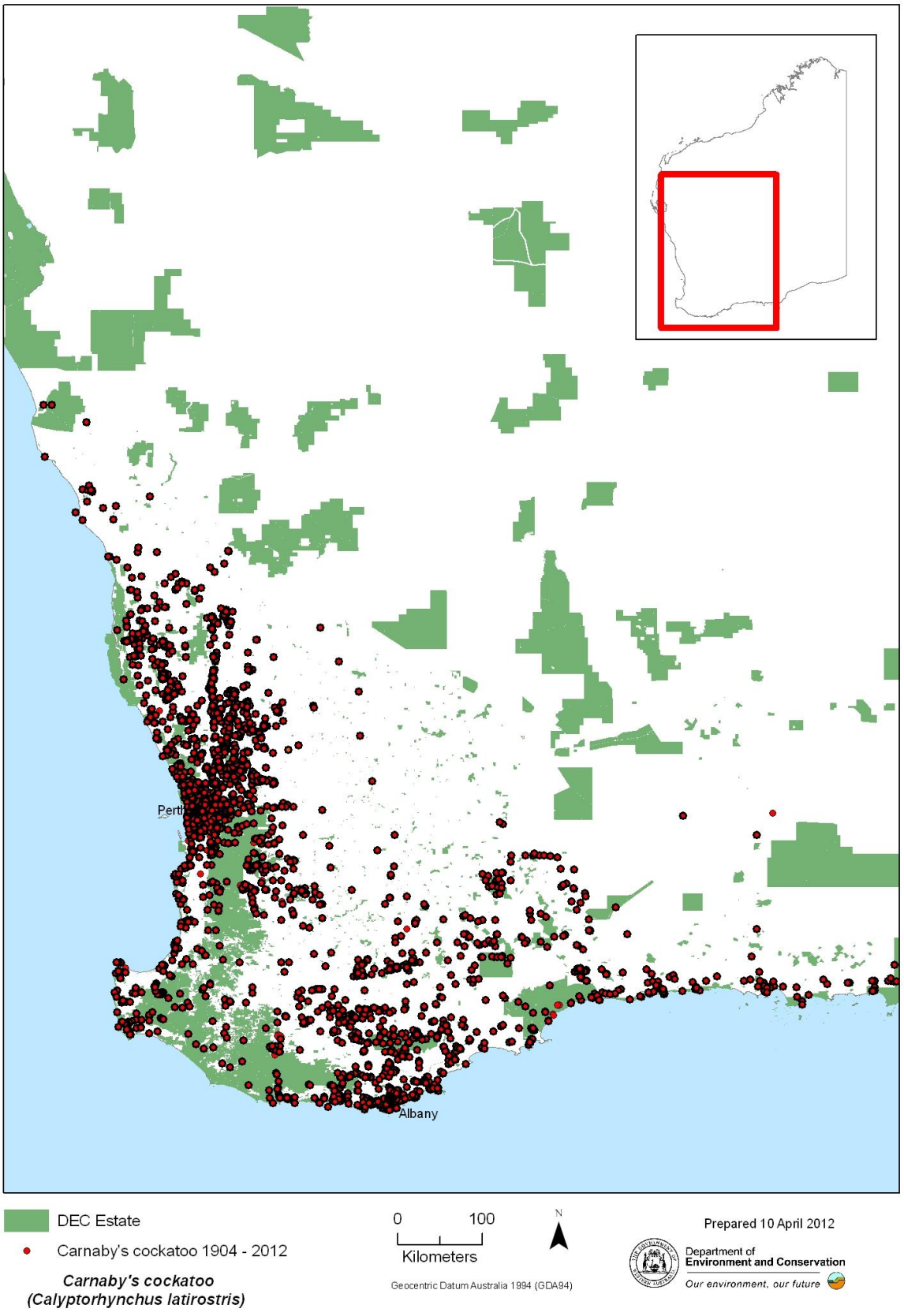

Figure 1: Distribution of Carnaby's cockatoo based on reported sightings between 1904 and 2012.

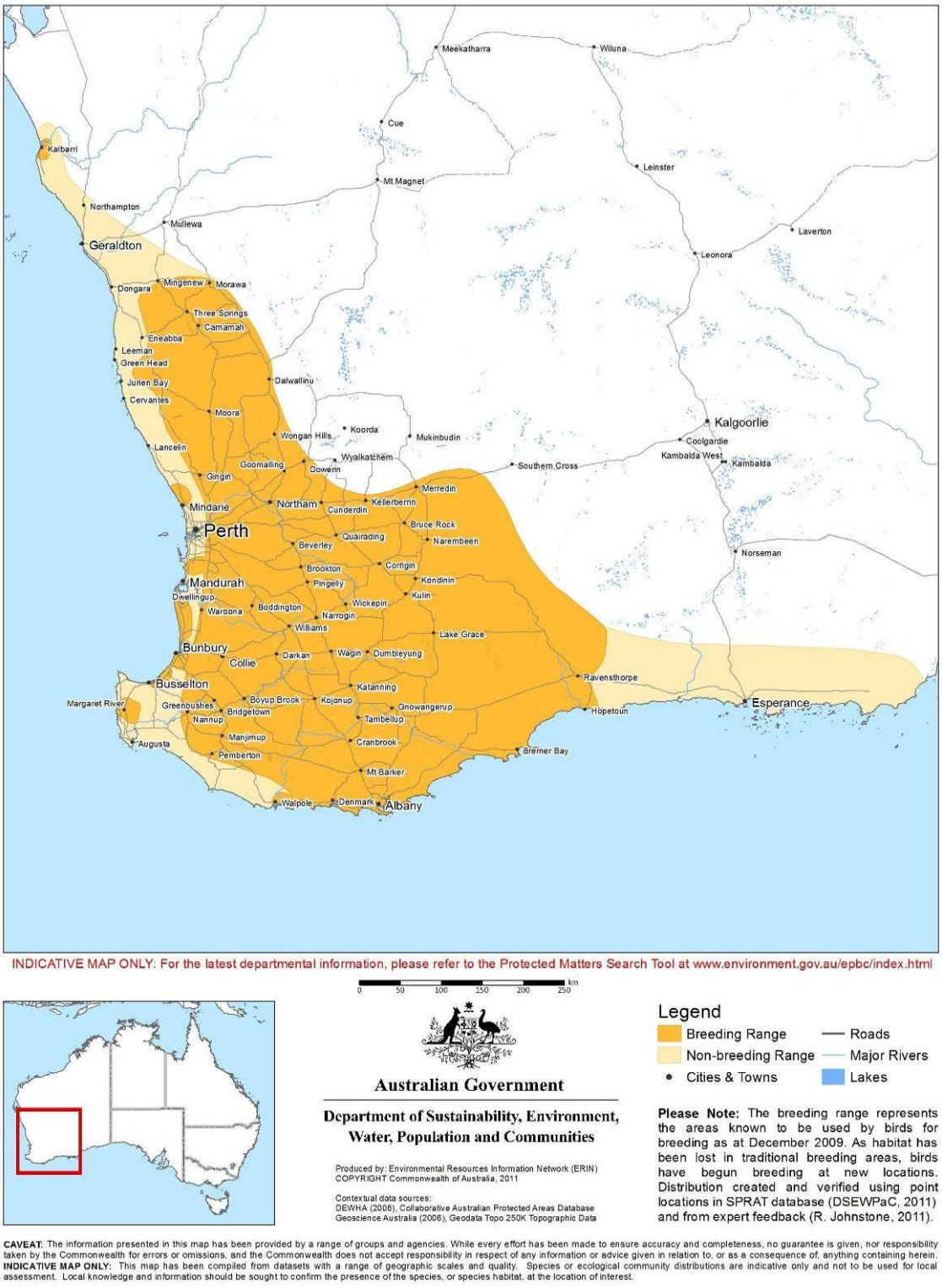

Figure 2: Modelled breeding and non-breeding distribution of Carnaby's cockatoo *Calyptorhynchus latirostris* (SEWPAC 2012a).

2.4 Extent of Occurrence and Area of Occupancy

Minimum convex polygons are used to estimate the extent of occurrence (EOO) or area of a species' range, and to assess trends in occupied habitat (Burgman and Fox 2003). The minimum convex polygons are constructed around the most extreme points in space, and so are sensitive to errors in location and the influence of outlying records (Burgman and Fox 2003). The use of EOO for Carnaby's cockatoos is subject to limitations because the effort for obtaining records is not evenly distributed across space, the species is highly mobile, and their range is divided into breeding and non-breeding areas. While Carnaby's cockatoo has become locally extinct in many areas within its historical range, it is still present close to the northern, southern and western limits of this range, therefore analysis does not show any significant change of EOO over time. An EOO of 364,200 km^2 has been calculated for Carnaby's cockatoo based on records from 1904 to 2010.

Area of occupancy (AOO) is defined as the area actually occupied within the EOO for a given taxon, excluding cases of vagrancy. These calculations are very scale dependant and determining the most appropriate scale depends somewhat on how mobile the species is. Although IUCN recommend a 2 x 2 km grid be used so comparison can be made across taxa, this is not considered appropriate for this highly mobile species. As such, three estimates were derived by summing the number of grid squares in which Carnaby's cockatoos were recorded as present; 10 x 10 km, 15 x 15 km and 20 x 20 km grid squares respectively (Table 1). These three grid square sizes demonstrate the variation that is associated with scale. These calculations include both breeding and non-breeding areas.

Continuing loss of habitat associated with clearing means that the AOO has declined for Carnaby's cockatoo. The AOO was calculated for data both prior to 2003, and between 2003 and 2010 and demonstrate this decline (Table 1.) The most recent estimate of AOO (2010) for Carnaby's cockatoo is between 34,500 km^2 and 86,800 km^2 (Table 1).

Table 1: Area of occupancy for Carnaby's cockatoo[1].

Grid Size (km)	Pre-2003 (km^2)	Post-2003 (km^2)	Net loss (%) in area of occupancy
10 x 10	62,600	34,500	55.1
15 x 15	98,100	60,525	61.7
20 x 20	134,800	86,800	64.4

[1] The data used for this analysis includes the Department of Environment and Conservation's Threatened and Priority Species Database, BirdLife Australia Atlas 1 and 2, Land for Wildlife records, WA Museum records, and data from appropriately experienced independent researchers. To focus the analysis onto core habitat areas, the data were filtered to include only records of breeding, feeding or night roosting. In order to estimate the full range of the species in calculating Area of Occupancy, a grid block was considered to be part of the species range if it had one or more records. After filtering, the data were separated into pre and post 2003 records.

2.5 Biology and Ecology

Carnaby's cockatoos nest in the hollows of live or dead eucalypts, primarily the smooth-barked Salmon Gum and Wandoo (Saunders 1979b, 1982), though breeding has been reported in other wheatbelt tree species and some tree species on the Coastal Plain and jarrah forest (Saunders 1979b, 1982; Storr 1991; Johnstone and Storr 1998; Johnstone *et al.* 2011) (see Groom 2010a for tree species used for breeding by Carnaby's cockatoo). Carnaby's cockatoos have been recorded nesting in trees on private property, road and railway reserves, conservation estate and other crown land. There are significant breeding areas located outside the conservation estate, particularly along rail and road reserves and on agricultural land (Saunders 1982; Saunders and Ingram 1998; BirdLife Australia Cockatoo Database 2011). Success in breeding is dependent on the quality and proximity of feeding habitat within 12 km of nesting sites (Saunders 1977, 1986; Saunders and Ingram 1987). Along with the trees that provide nest hollows, the protection, management and increase of this feeding habitat that supports the breeding of Carnaby's cockatoo is a critical requirement for the conservation of the species.

In 1998, Saunders and Ingram considered that there were sufficient hollow-bearing eucalypts for Carnaby's cockatoos in the Wheatbelt, however the senescence and loss of ageing hollows, and competition for hollows is likely to be an issue for the conservation of the species. One of the indirect effects of broad-scale clearing for agriculture in the south-west of Western Australia is that there is a lack of recruitment of nesting trees (Saunders *et al.* 2003). As a consequence there may be a shortage of suitable nesting hollows in some areas in the future, regardless of whether there is sufficient suitable foraging habitat present within close proximity to those breeding sites.

During the non-breeding season (January to July) the majority of the birds migrate to the higher rainfall coastal regions of their range in the midwest coast, Swan Coastal Plain and south coast (Saunders 1980, 1990; Berry 2008; Saunders *et al.* 2011b; Johnstone *et al.* 2011), though some non-breeding birds remain in non-breeding areas all year round. These areas have better natural water sources over the summer period and historically had extensive areas of proteaceous woodlands and shrublands to provide feed for young birds, and good resources for adult birds to stock up for the following breeding season.

Large-scale removal of native vegetation and increased widespread availability of introduced food species has resulted in a significant shift in the dietary composition for Carnaby's

cockatoo. A traditional diet of mostly native seeds and nectar has changed to include increased amounts of seeds from introduced plant species (Groom 2010a) such as commercial broad-acre crops (e.g. canola *Brassica napas* and *B. juncea*) (Jackson 2009) and in the non-breeding part of the species' range, plantation pines (Saunders 1980; Johnstone and Storr 1998; Higgins 1999; Finn *et al*. 2009). In particular, the pine plantations immediately north of Perth have been recognized as an important food resource for Carnaby's cockatoo for over 60 years (Perry 1948; Saunders 1980; Johnstone *et al.* 2011).

2.6 Conservation Status

Carnaby's cockatoo is specially protected under the Western Australian *Wildlife Conservation Act 1950* as fauna that is considered 'likely to become extinct'. It has been ranked as Endangered by the Western Australian Threatened Species Scientific Committee using IUCN (1994) Red List Categories and Criteria, meeting Criterion A1abc. The Western Australian Minister for Environment has endorsed this ranking. Carnaby's cockatoo meets IUCN Criterion A for Endangered as it has suffered a population decline of at least 50% over the past three generations or 45 years (generation time = the average age of breeding adults in the population which is estimated to be 15 years). This trend is based on direct observation (Criteria A1a), a decline in the AOO (see section 2.4), and quality of habitat (Criteria A1c). There has also been a noted decline in the number of birds in the population (Criteria A1b).

Carnaby's cockatoo is listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Action Plan for Australian Birds 2000 listed Carnaby's cockatoo as Endangered A1abc+2abc (Garnett *et al*. 2011). Criterion 2 included as the decline is considered likely to continue and based on the same factors mentioned above (a, b, and c; Garnett and Crowley 2000).

3 HABITAT CRITICAL TO SURVIVAL

Habitat critical to survival of Carnaby's cockatoo reflects the distinct, but equally important, behavioural components during the breeding and non-breeding seasons. The long-term survival of a robust population of Carnaby's cockatoos depends on the availability of suitable woodland breeding habitat and tree hollows, and foraging habitat capable of providing enough food to sustain the population. More recently, night roost sites have been recognised as important components of the non-breeding habitat. While it is clear that loss of breeding sites should be avoided, at present there is inadequate information to provide for robust quantification across the species range detailing which habitat could be lost without having a

significant adverse impact on the Carnaby's cockatoo population in the long term. In the absence of such information most habitat that provides for feeding, regular roosting and potential for breeding is considered important. Identified breeding and nearby feeding habitat, former breeding habitat that has hollows intact and vegetation that provides habitat for feeding, watering and regular night roosting is considered habitat critical for recovery of the species.

Specific elements of Carnaby's cockatoo habitat, such as nesting sites and night roost sites can be identified and mapped (e.g. Shah 2006, Burnham *et al.* 2010, Glossop *et al*. 2011, Johnstone *et al.* 2011, Kabat *et al.* 2012). However it is difficult to accurately designate and quantify the value of the more 'diffuse' critical habitat such as feeding habitat, mainly because the species is highly mobile and adaptive, and uses resources spread over a relatively large area. The application of a 'buffer' around point records of nesting sites and night roost sites may reflect the potential use of these areas by cockatoos (Glossop *et al.* 2011). In addition, the ecology of the species makes mapping difficult because it involves seasonal migration and movement over long distances (Saunders 1980; Johnstone *et al.* 2011), and the species now depends on altered landscapes. Work proposed under this recovery plan will refine our knowledge and help in the more precise identification and location mapping of habitat critical to the survival of the species.

Habitat critical to survival for Carnaby's cockatoos can be summarized as:

- The eucalypt woodlands that provide nest hollows used for breeding, together with nearby vegetation that provides feeding, roosting and watering habitat that supports successful breeding;
- Woodland sites known to have supported breeding in the past and which could be used in the future, provided adequate nearby food and/or water resources are available or are re-established;
- In the non-breeding season the vegetation that provides food resources as well as the sites for nearby watering and night roosting that enable the cockatoos to effectively utilise the available food resources.

4 KNOWN AND POTENTIAL THREATS

There are multiple reasons for the decline of Carnaby's cockatoo. The decline to date has been brought about primarily by the extensive clearing of nesting and feeding habitat during the 20th century. Continuing threats mostly relate to loss of habitat due to clearing or degradation, competition for nest sites, and loss of individuals due to illegal activities, collisions with motor vehicles and disease. Key aspects of their ecology, such as long generation time (> 15 years), mean that the effect of many of these threats will not be immediately evident. For example threats that reduce breeding success, or result in high mortality of chicks or young birds will not change the number of adult birds for many years.

4.1 Loss of Breeding Habitat

The breeding habitat of Carnaby's cockatoo is made up of the eucalypt woodlands that provide breeding hollows, together with feeding areas and watering sites within foraging distance of breeding sites. The loss of functioning breeding habitat as a whole is due to threats that impact on one or all of these components. Although most habitat loss across the species' entire distribution occurred before the 1980s, habitat loss and degradation continues to occur (Saunders 1990; Shah 2006). Approximately 87% (525,732 ha) of potential Carnaby's cockatoo habitat (i.e. areas of vegetation that contain flora species and vegetation types that could support the species' breeding, feeding and night roosting activities) has been cleared in the wheatbelt since European settlement (DEC unpublished data, 2010).

In the short term (decades), the loss or degradation of feeding habitat adjacent (i.e. <12 km) to breeding sites is considered to pose the greatest risk to Carnaby's cockatoos (Saunders and Ingram 1998). The clearance of heathlands from around woodland breeding sites and the removal of corridors of native vegetation that connect breeding and foraging sites in the wheatbelt region of Western Australia reduces the amount of food available for breeding birds, which will lead to a reduction in productivity and survival of young (Saunders 1977, 1980, 1982, 1986; Saunders *et al*., 1985; Saunders and Ingram 1987, 1998; Garnett and Crowley 2000). Other factors can contribute to the degradation and loss of habitat, such as altered fire regimes, altered hydrology including drawdown, salinity, grazing, weed invasion, climate change, *Phytophthora* dieback and mining (Hobbs 1987; Johnstone *et al.* 2008; Johnstone *et al.* 2011).

Hollow-bearing trees suitable for nesting are now largely restricted to remnant patches of woodland and individual trees within cleared sites (e.g. paddock trees) (Saunders and Ingram 1998). A lack of natural recruitment appears to be caused by a combination of factors including salinity, reduced annual rainfall over the past 30 years (Pittock 1988; Yates *et al.* 1994; CSIRO 2007), a lack of regeneration events (Yates *et al*. 2000), trampling and soil compaction caused by stock and grazing by stock and rabbits (Wilson 1990; Saunders *et al*. 2003), competition from introduced grasses, and altered hydrological and fire regimes (Hobbs 1987). Studies have reported that it takes 100-200 years for trees to develop suitable hollows (Saunders *et al.* 1982; Rose 1993; Whitford and Williams 2002). Individual trees that contain nest hollows and the nest hollows themselves may be lost as a result of tree-fall, fire, collapse of the nest chamber or damage to the hollows by people (Saunders 1979b). It is sometimes possible to repair damage and so extend the life of individual nest hollows.

Competition for nest hollows with other species will also reduce the number of nest hollows available to Carnaby's cockatoos. Species that compete for nest hollows include the native and introduced corellas (*Cacatua* species), galahs *(Cacatua roseicapilla*), Australian shelducks (*Tadorna tadornoides*), Australian wood ducks *(Chenonetta jubata*) and feral European honey bees (*Apis mellifera*) (Saunders 1979b, 1982; Johnstone and Kirkby 2007; Johnstone *et al*. 2008, Johnstone *et al.* 2011). Additionally, the destruction of nest hollows from nest robbing for the illicit aviculture trade may also reduce the number of nest hollows. Interference with breeding behaviour from other species may lead to breeding failures (e.g. eggs broken by *C. roseicapilla* and *C. pastinator butleri*) (Saunders 1982). The threat posed by western corella and galah is increasing as their populations increase in size and their distribution expands in south-west Western Australia (Johnstone and Storr 1998).

In 2000, approximately 16% of the south-west agricultural areas of Western Australia was estimated to be affected by salinity due to shallow water tables (Short and McConnell 2000). The area affected by salinity is considered likely to increase to 20% by 2020 and to 33% by 2050. However, salinity generally impacts areas low in the landscape (i.e. valley floors) and thus the effect on Carnaby's cockatoo is dependent on the parts of the landscape they are using.

4.2 Loss of Non-Breeding Foraging and Night Roosting Habitat

A further significant threat is the clearing, fragmentation and degradation of foraging and night roosting habitat in the non-breeding parts of Carnaby's cockatoo range in the south-west of Western Australia. In particular, the clearing of feeding habitat on the Swan Coastal Plain

(e.g. *Banksia* woodlands and commercial pine plantations which provide a significant food resource (Perry 1948; Saunders 1974, 1980, 1990; Shah 2006; Valentine and Stock 2008; Finn *et al*. 2009; Johnstone *et al.* 2011)). Native and exotic suburban trees on private and public lands provide a source of habitat for roosting and feeding in the Perth metropolitan area (Johnstone and Kirkby 2008; Johnstone *et al*. 2008; Burnham *et al*. 2010; Kabat *et al*. 2012) and are at risk as urbanisation intensifies and amenity vegetation is lost with urban infill.

Records show that on the Swan Coastal Plain, 617,895 hectares (or 54%) of potential Carnaby's cockatoo habitat (i.e. areas of native vegetation that contain flora species and vegetation types that could support the species' breeding, feeding and roosting activities) has been cleared since European settlement (DEC unpublished data, 2010), and there is ongoing and increasing pressure for continued urban development in the Perth and Peel regions, as well as other cities and towns in other parts of the distribution of Carnaby's cockatoo.

Carnaby's cockatoos are dependent on water being available in the vicinity of roosting sites (Shah 2006; Johnstone and Kirkby 2008; Burnham *et al*. 2010). Important watering points include natural water bodies and artificial water sources such as public fountains, bird baths, artificial dams, stock watering troughs and sprinklers (Johnstone and Kirkby 2008; G. Barrett, DEC, *pers. comm*. 2011). There is evidence that natural water bodies in the south-west are drying up (Wilson and Valentine 2009) and groundwater drawdown may be impacting habitat quality. Excessive groundwater drawdown resulting in the lowering of the watertable has the potential to impact habitat quality through vegetation decline on the Swan Coastal Plain.

4.3 Tree Health

Premature decline syndromes have recently been recorded for many important food and roosting tree species throughout Western Australia. These species include, but are not confined to tuart (*Eucalyptus gomphocephala),* wandoo (*E. wandoo*), jarrah (*E. marginata*), marri (*Corymbia calophylla),* flooded gum (*E. rudis*) and WA peppermint (*Agonis flexuosa*). Soil-borne, foliar and canker pathogens, and insects have been implicated in these declines and are under investigation (Centre of Excellence for Climate Change, Woodland and Forest Health 2012). A widespread decline in the health of canopy species and the ecosystems they support would have consequences for Carnaby's cockatoos in terms of available nesting, food and roosting sites (Saunders *et al.* 1982, 2003).

One particularly aggressive plant pathogen that has been identified in south-west Western Australia is *Phytophthora cinnamomi*. *Phytophthora* disease (or 'dieback') occurs when there

is a combination of susceptible plant species, the presence of the pathogen and vulnerability due to environmental conditions (Environment Australia 2001; O'Gara *et al*. 2005). Susceptible native species include most of the Proteaceae family (e.g. *Banksia* species) and a few taxa of the Myrtaceae family (e.g. jarrah) (Shearer *et al*. 2007), both widely used by Carnaby's cockatoo. *Phytophthora* dieback can lead to losses of susceptible species, reduction in primary productivity and biomass of these species, altered plant species abundance and richness, changes in community composition and structure, and degradation of habitat for both flora and fauna (Weste 1974; Podger and Brown 1989; Hill *et al*. 1994; Wilson *et al*. 1994; Environment Australia 2001; McDougall *et al*. 2002; Weste *et al*. 2002; Shearer *et al*. 2007; Cahill *et al*. 2008).

4.4 Mining and Extraction Activities

Extraction of sand and gravel, and the mining of mineral sands, iron ore and limestone in the south-west, and of bauxite in the jarrah forests involves the clearing of native vegetation. In some areas such clearing could affect the survival of the species (Johnstone *et al*. 2008), particularly when associated with a change in land use following the mining activity (e.g. to housing development) rather than being regenerated.

Where mining occurs in feeding habitat and is followed by revegetation, this could be considered only a short to medium term loss of habitat. Depending on the species involved and the quality of establishment, revegetation of feeding habitat can begin providing food resources for black cockatoos in eight years (Lee *et al.* 2010). However it is not guaranteed that revegetation will provide the same amount of food value as the original native vegetation, and there are many factors that result in a high risk of failure of revegetation efforts in south-west vegetation types (David Mitchell, DEC, *pers. comm*. 2012).

Clearing for mining that results in the loss of eucalypts with nest hollows will result in a loss of breeding habitat for a significant time and so is likely to impact the species. Eucalypts do not grow large enough to provide nest hollows for Carnaby's cockatoo for at least 100 to 200 years (Saunders *et al.* 1982; Rose 1993; Whitford and Williams 2002) and despite any revegetation that seeks to replace breeding tree species, any loss of breeding trees or habitat could be considered equivalent to permanent clearing of these breeding trees.

4.5 Illegal Shooting

Carnaby's cockatoos are illegally shot by landholders where they are considered to be damaging nut and fruit crops and the tops of pine trees (Pittman *et al*. 2007; Saunders *et al.*

2011a). Death by shooting is considered a significant threatening process for the Carnaby's cockatoo species because it reduces the number of birds recruited into local populations and also directly reduce the number of breeding adults. Though direct evidence is lacking, illegal poisoning may also occur.

Injured individuals of the three species of black-cockatoos in south-west Western Australia (Carnaby's cockatoo, Baudin's cockatoo and forest red-tailed black cockatoo (*C. banksii naso*)) are often brought to the Perth Zoo and private wildlife carers. Of the 565 individuals brought into the Perth Zoo from 2000-2009, 49 had been shot (Saunders *et al*. 2011b). This number does not quantify incidences of shooting-related deaths as birds may have been wounded and died without being detected or recorded, or killed and disposed of in the field.

4.6 Illegal Taking

Carnaby's cockatoo is a highly prized cage bird and some eggs and nestlings are taken illegally for avicultural markets (Saunders 1979a; Saunders *et al*. 1985; Mawson and Johnstone 1997; White *et al.* 2011b), where they can be sold for high domestic market prices (~ $1100 per bird and $3000-$5000 per pair (Mawson 1997)). Often trees are cut down or the hollows severely damaged when young and eggs are taken, making these sites unsuitable for future breeding attempts. Between 1991 and 2008 there were 39 prosecutions brought to court against individuals for illegal dealings with Carnaby's cockatoo, resulting in 14 convictions under the *Wildlife Conservation Regulations 1970*. Despite regular publicity following successful prosecutions the observed rate of illegal taking from the wild does not appear to be diminishing.

4.7 Climate Change

Climate change is one of the primary global threats to biodiversity and ecosystem function (Brook *et al*. 2008) and the south-west of Western Australia has been assessed as being particularly vulnerable to the effects of climate change (Pouliquen-Young and Newman 2000; Howden *et al.* 2003). There has been an observed rainfall decrease of 10-20% in the south-west since the 1970s and an approximate increase in temperature of 0.7^{o}C since the 1950s, with warming greater in winter (CSIRO 2002; IOCI 2002). The predicted future trend is continued warming and a decreased winter rainfall, with suggestions of an approximate rise of 1^{o}C and a 70 mm per annum reduction in annual rainfall by 2030 (CSIRO 2002; Timbal 2004). Such a decline in rainfall is likely to have a significant effect on the extent and

survival, or capacity for regeneration of the vegetation within the breeding and non-breeding habitat of Carnaby's cockatoo across its range.

Successful regeneration of the eucalypt species that provide nest hollows requires specific regeneration events, including fire and subsequent rainfall, as well as an adequate rainfall regime after germination. These events may be reduced under future climate change scenarios to the species detriment. The timing and frequency of flowering, and subsequent amount of seed production may also be affected by climate change.

Stochastic events can lead to significant changes to the local population dynamics of birds, including breeding birds, leading to a subsequent reduction in recruitment. Recently Carnaby's cockatoo has shown to be susceptible to catastrophic and unpredictable events. For example in March 2010, a reported 36 Carnaby's cockatoos died and 20 were injured as a result of a severe hail storm within the Perth metropolitan area, and in January 2010 heat stress accounted for the death of over 200 Carnaby's cockatoos at Hopetoun and Munglinup on the south coast of Western Australia (Saunders *et al.* 2011b).

Predictions of climate change in the south-west of Western Australia are that there will be an increased frequency of extreme weather events (Saunders *et al*. 2011b).

4.8 Collisions with motor vehicles

An analysis of data collected for all black cockatoos (Carnaby's cockatoo, Baudin's cockatoo and forest red-tailed black cockatoo) received into care by the DPaW and the Perth Zoo during 2009-2010 indicates that injury or death due to collision with motor vehicles accounts for up to 10% of all cockatoos examined (Saunders *et al.* 2011b). These data are considered to be conservative estimates as a larger proportion of the cockatoos examined had sustained bone fractures, but there were inadequate data accompanying the specimens to assume that those injuries had definitely been sustained from collisions with vehicles. In addition there are likely to be a large proportion of birds killed by motor vehicle collisions that are not reported.

Vehicle strike has been recognised as being an important threatening factor for black cockatoos and is likely to increase in significance as the number of vehicles on roads in Western Australia grows (Le Souëf 2012). In addition, the chance of collisions with vehicles may increase in frequency with some modifications and upgrades to roads (e.g. paving of gravel roads) which allow vehicles to travel at higher speeds and in increased numbers. The proximity of food and pooled water to roadsides combined with increased traffic volumes and

traffic speeds, places the cockatoos at an increased risk of collision with vehicles. While it is not realistic to eliminate all mortality due to these collisions, using sensible road designs, not intentionally planting food resources near busy roads, planting large areas of better quality food supplies away from roads, ensuring that rainfall runoff from roads drains into areas well clear of road verges, and increased signage may reduce collisions with vehicles. It is recognised that redesigning already established road networks, particularly in rural areas, may not be practical. In such cases hotspots should be identified for targeted works, and signage erected as a minimum.

There have been significant advances in the capacity to treat, rehabilitate and release injured birds back into the wild. Previously only 30% of injured birds recovered by DPaW were able to be released back into the wild. With the collaborative development of new handling protocols along with better informed treatment regimes and assistance of volunteers, the proportion of cockatoos that have been released back to the wild has steadily risen to the current level of 54% (DPaW / Perth Zoo unpublished data).

Though data are lacking, collision with other structures (e.g. powerlines) may also be impacting Carnaby's cockatoo.

4.9 Disease

Many aspects of the disease status of wild Carnaby's cockatoo populations remain unknown, however, recent research has highlighted the potential importance of the role of disease in the conservation of Carnaby's cockatoos (Saunders *et al*. 2011b; Le Souëf 2012).

Infectious diseases such as beak and feather disease virus (BFDV), avian polyomavirus (APV) and chlamydophilosis may pose a threat to Carnaby's cockatoo (DEWHA 2005), as they are significant in other captive and free-living psittacine species (Bernier *et al.* 1981; Gilardi *et al.* 1995; Ortiz-Catedral *et al.* 2009). Murdoch University, in collaboration with DPaW and Perth Zoo, has commenced research on the health of free-living black cockatoo, primarily Carnaby's cockatoo nestlings in the south-west of Western Australia. This study is investigating the prevalence of BFDV, APV and *Chlamydophila psittaci* infection in black cockatoo nestlings. During the 2010 nesting season, BFDV was detected in 8.5% of nestlings and in nest material from one nest (9%). Five nestlings also tested positive to APV and three chicks were concurrently infected with both viruses. No nestlings tested positive for *C. psittaci* infection or exposure. The detection of BFDV and APV in the nestlings is of

potential concern, however the clinical significance of these viral infections remains unknown and long-term research is required.

To date, infection with or exposure to *C. psittaci* has not been detected in any wild black cockatoos admitted to the Perth Zoo Veterinary Department for treatment or rehabilitation. However, an outbreak of chlamydophilosis occurred in black cockatoos at a rehabilitation centre in 2010. The origin of infection in these birds remains unknown (Le Souëf, Perth Zoo, *pers. comm*. 2011). This outbreak highlighted the importance of appropriate disease risk management practices to minimise the transmission of disease from wild psittacines to black cockatoos undergoing rehabilitation and prevent released birds introducing novel diseases into wild populations.

In September 2009 at least 12 Carnaby's cockatoo hens were found dead in nest hollows at Coorow. The bodies were severely autolysed when found, therefore testing was limited but it seems probable that the deaths were due to disease infection or toxicity (Saunders *et al.* 2011b).

Wildlife diseases may be an undetermined risk, and until reliable baseline data are collected it will not be possible to adequately interpret the results of the recent events that have been observed. Long-term monitoring of wild black cockatoo nestlings and opportunistic sample collection from injured wild adult birds is essential for providing insight into the epidemiology and significance of disease as a threatening agent for Carnaby's cockatoo.

5 GUIDE FOR DECISION MAKERS

Loss of habitat caused by development and on-ground works (e.g. residential and industrial development, firebreaks, road works, mining, drainage works) may significantly affect Carnaby's cockatoo and so such developments may require environmental impact assessment under the Western Australian *Environmental Protection Act 1986* and/or the Commonwealth EPBC Act. In addition taking of individual Carnaby's cockatoo requires licensing under the Western Australian *Wildlife Conservation Act 1950*.

The Environmental Protection Authority (EPA) has published information about approaches and expectations for environmental impact assessment in Guidance Statement No. 33 Environmental Guidance for Planning and Development (EPA 2008), which provides the EPA's advice on a range of environmental factors in order to assist participants in land use planning and development to protect, conserve and enhance biodiversity and environmental values.

Habitat of Carnaby's cockatoo is considered under Guidance Statement No. 33 as areas of high conservation significance that the EPA expects must be fully protected in Western Australia. Further, Guidance Statement No. 33 states that the EPA is unlikely to recommend the approval of projects that have significant adverse impact on the species.

The Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) has published guidance on how the EPBC Act will be applied, notably the *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (DEWHA 2009), and the *EPBC Act 1999 Referral Guidelines for three threatened black cockatoo species* (SEWPAC 2012a) which provides guidance on whether a proposed action requires a referral under the EPBC Act.

Both the State and Commonwealth governments may produce further guidance in relation to the conservation of Carnaby's cockatoo during the life of this recovery plan

The success of this Recovery Plan can only be achieved by avoiding those activities that will adversely affect Carnaby's cockatoo and then minimizing or mitigating those that cannot be avoided.

Activities that may have an impact on Carnaby's cockatoo, or its habitat include:

- Any activity or action that leads to the permanent loss of eucalypt woodlands within the species range that currently or potentially provide nest hollows for breeding, along with nearby areas that provide important feeding and watering habitat that supports breeding of Carnaby's cockatoo.
- Any activity or action that leads to the permanent loss of native vegetation that forms habitat of Carnaby's cockatoo during the non-breeding season, that provides for feeding, night roosting and watering.
- Any activity or action that leads to temporary loss of native vegetation related to breeding, feeding, watering or night roosting habitat for Carnaby's cockatoo.
- Any action, including changes in land use and hydrology within catchments, that leads to the cumulative loss or degradation of areas currently or potentially used as breeding feeding, watering or night roosting habitat.
- The removal, without adequate replacement, of extensive areas of commercial pine plantations on the Swan Coastal Plain, and elsewhere, on which major flocks now depend for food.

- Clearing of areas of habitat (feeding, roosting and breeding) that have been established through revegetation or restoration, and are successful in providing resources for Carnaby's cockatoo (e.g. offsets for this species).

Some actions do not directly affect Carnaby's cockatoo but can create a foreseeable likelihood of future impacts on the species through conflicts with human endeavour. For example establishment of commercial plantations of species (including nut and fruit tree crops) known to be very attractive to black cockatoos within the range of a black cockatoo species will, without effective impact avoidance measures, lead to crop damage from cockatoos and likely conflicts. This likelihood needs to be included when planning for such activities and decision makers should only support such endeavours where effective mitigation/avoidance is incorporated in the plan (e.g. avoiding cockatoo areas, appropriate plantation design and cockatoo exclusion netting). Another example is road design and maintenance that inadvertently attracts cockatoos to roadsides to drink from puddles or feed on spilt grain, or roadside plantings of food plants, leading to likelihood of death or injury when feeding birds are hit by motor vehicles. This conflict is foreseeable and can be avoided with careful attention to road design, construction and maintenance, and by avoiding planting foraging species as roadside rehabilitation on roadways.

Mapping of habitat used for breeding, feeding, watering and night roosts can provide a tool to assist in conservation planning and recovery activities for the species, and also for strategic land use planning. It can provide an initial step in assisting statutory planners or consultants in deciding whether the conservation of Carnaby's cockatoo needs to be considered in a given planning area. Such spatial tools can identify areas that require investigation as Carnaby's cockatoo habitat, and additional detailed site mapping and field examination is recommended for identifying actual Carnaby's cockatoo resources or use by Carnaby's cockatoo before any environmental assessment or planning decisions are made.

When making planning and environmental approval decisions and decisions on management of areas, decision makers should ensure consistency with this Recovery Plan as well as guidance provided by the EPA and SEWPAC, and seek to fully protect Carnaby's cockatoo habitat. If additional clearing of large areas of habitat critical to survival continues and if there is not significant success in replacing important habitat approved for development it is likely there will be further reductions in the population of Carnaby's cockatoo resulting in a failure to achieve the success criteria of this Recovery Plan.

6 MANAGEMENT PRACTICES AND POLICIES

Due to the broad geographic area and variety of habitats used by Carnaby's cockatoo, a range of policies, strategies and plans have a role in the protection of the species and areas of habitat that support Carnaby's cockatoo. They include, but are not limited to:

- DPaW Policy Statement No. 29 Translocation of Threatened Flora and Fauna (CALM 1995);
- DPaW Policy Statement No. 33 Conservation of endangered and specially protected fauna in the wild (CALM 1991);
- Minimising Disease Risk in Wildlife Management (Chapman *et al.* 2011);
- Threat Abatement Plan for dieback caused by the root-rot fungus *Phytopthora cinnamomi.* (Environment Australia 2001);
- Guidelines for Protection of the Values of Informal Reserves and Fauna Habitat Zones, DPaW, Sustainable Forest Management Series, SFM Guideline No. 4 (DEC 2009);
- Guidelines for the Selection of Fauna Habitat Zones, DPaW, Sustainable Forest Management Series, SFM Guideline No. 6. (DEC 2010);
- Western Australian Forest Management Plan 2004-2013 and 2014-2023 for south west forests;
- The Action Plan for Australian Birds 2010 (Garnett *et al*. 2011);
- DPaW Regional Biodiversity Plans for the Midwest, South Coast, South West, Swan, Wheatbelt, and Warren Regions;
- Recovery Plans for species with some overlapping habitat requirements (e.g. Forest Black Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii naso)* Recovery Plan 2007-2016 (Chapman 2008);
- EPBC Act Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's cockatoo (vulnerable) *Calyptorhynchus baudinii* and Forest red-tailed black cockatoo (vulnerable) *Calyptorhynchus banksii naso* (SEWPAC 2012a);
- EPBC Act Environmental Offset Policy (SEWPAC 2012b);
- EPA Position Statements (e.g. Environmental Protection of Native Vegetation in WA Position Statement No. 2; Environmental Offsets Position Statement No. 9);

- WA Environmental Offsets Policy (Government of Western Australia, September 2012);
- Regional Fire Management Plans and Guidelines within the species range;
- Area management plans for DPaW managed conservation reserves and parks, as well as area management plans for local government and other lands managed for conservation within the species range;
- Landscape scale conservation management plans, strategies and projects (e.g. A biodiversity and cultural conservation strategy for the Great Western Woodlands (DEC 2011d), NRM groups and Catchment Councils);
- Private land conservation actions under conservation covenants or other voluntary habitat conservation management under programs including Conservation Covenants , Land for Wildlife, etc.;
- Non government organisation programs that encourage landholders to rehabilitate and/or retain remnant habitat (e.g. BirdLife Australia's Carnaby's Black-Cockatoo Recovery Project, WWF's 'Healthy Bushland'; Gondwana Link)
- Private, non government organisations such as the Australian Wildlife Conservancy and Bush Heritage Australia which purchase property with suitable habitat and aim to manage these properties for conservation purposes

7 INTERNATIONAL OBLIGATIONS

All parrots and their allies in the Order Psittaciformes, including Carnaby's cockatoo, are listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Australia is a member country to CITES and thus has an obligation to ensure that international trade in specimens of this species does not threaten their survival (CITES 1973). The recovery plan is consistent with these international obligations. This recovery plan is also consistent with the aims and recommendations of the Convention n Biological Diversity, ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention.

8 BIODIVERSITY IMPACTS AND BENEFITS

The implementation of this plan will provide biodiversity benefits to other threatened and important taxa of both flora and fauna and threatened ecological communities that occur within the area of occupancy of Carnaby's cockatoo. Details of threatened and priority fauna

and flora, and threatened and priority ecological communities inhabiting habitat critical used by Carnaby's cockatoo are available from DPaW.

Since Carnaby's cockatoo is found to occupy and utilize a wide range of habitats (i.e. forests, proteaceous vegetation, heathland vegetation) it can be considered an umbrella species and the protection of habitat critical to Carnaby's cockatoo will result in the protection of a variety of threatened and important flora and ecological communities. For example, declared rare flora records cross referenced with Carnaby's cockatoo habitat resulted in 138 declared rare flora records in breeding habitat, 816 records in feeding habitat, and 233 records roosting habitat.

Similarly there will be considerable benefits to other threatened and important fauna species including the direct protection and retention of habitat and specifically the retention and promotion of tree hollows for tree hollow dependant species. Cross referencing Carnaby's cockatoo habitat with threatened fauna records indicate that this benefit will extend to amphibians, arachnids, birds, crustaceans, fish, insects, mammals, molluscs and reptiles.

There are no expected negative impacts to biodiversity as a result of implementing this recovery plan.

9 SOCIAL AND ECONOMIC IMPACTS AND BENEFITS

Carnaby's cockatoos use both private and public lands to meet their requirements for breeding, feeding, watering and night roosting. While some private lands that contain Carnaby's cockatoo habitat are managed in a manner to protect and conserve Carnaby's cockatoo, some owners of private property that support Carnaby's cockatoo habitat have expectations of land development for other purposes. In some cases this expectation is supported by existing government planning and environmental approval decisions, such as zoning under Region Schemes and similar mechanisms under State planning legislation. The protection of all the habitat necessary to conserve the species may result in some land owners not receiving approval to develop part of their land resulting in some real or perceived economic impact. There are large areas of feeding habitat used by Carnaby's cockatoo in the metropolitan Perth and Peel regions that is not currently protected in conservation reserves.

Where the species is known to occur on or use habitat that occurs on private property, recovery actions will require continued liaison between stakeholders with regards to managing and protecting these areas. Where development is proposed on private property

containing Carnaby's cockatoo habitat the aim is to, where possible, protect the habitat through the statutory planning and environmental approval assessment processes.

Carnaby's cockatoos have a demonstrated ability to discover and use introduced plant species as new food sources, and are known to use pine plantations, and also to feed on nut crops and spilt canola. It is conceivable that in the future, birds could include more commercial agricultural crops in their diet beyond what has already been reported (Valentine and Stock 2008; Jackson 2009), which may result in damage to agricultural crops from cockatoo feeding and subsequent conflict with land owners.

Pine plantations have been demonstrated to be an important food source for Carnaby's cockatoo (Saunders 1980; Johnstone and Storr 1998; Higgins 1999; Finn *et al.* 2009). Historically plantations have been managed on a rotation basis resulting in a consistent food supply over the landscape and over years. The removal process for pines in the Gnangara, Pinjar and Yanchep plantations is underway (staged removal between 2004 and 2031) with no stated plan to re-establish the pine plantations. Not providing an alternative food resource following removal of pines is likely to have a significant impact on the food resources available to Carnaby's cockatoo in the Perth region. Efforts to avoid (by retaining pine trees that might otherwise be harvested) or mitigate (replanting of cockatoo feed species) this impact may incur significant economic costs.

10 AFFECTED INTERESTS

Stakeholders potentially affected by the implementation of this plan can be divided into broad groups:

- managers of lands that are important to Carnaby's cockatoos;
- groups and organisations that provide funding or carry out recovery actions for Carnaby's cockatoo and assist in implementation and research; and
- decision makers and those that provide infrastructure or undertake broadscale development. Examples of such stakeholders are presented in Table 2.

Table 2: Stakeholders potentially affected by the implementation of this plan.

Stakeholder Group	Examples
Decision makers	• Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) • Conservation Commission of Western Australia • Department of Parks and Wildlife (DPaW) • Department of Agriculture and Food WA (DAFWA) • Forest Products Commission of Western Australia • Environmental Protection Authority (EPA) • Local Government Authorities • Western Australian Planning Commission (WAPC) • Agencies with delegated decision making authority
Land managers	• Department of Parks and Wildlife (DPaW) • Other State government agencies • Local Government Authorities • Commonwealth Department of Defence, and other Commonwealth agencies • Private landholders including industry and NGOs managing land for conservation
Implementation and research	• BirdLife Australia • Perth Zoo • Regional Natural Resource Management (NRM) groups • Western Australian Museum • Western Australian universities • Wildlife carers and rehabilitation providers • Volunteer and community groups, and individuals
Development and infrastructure providers	• Local governments • Land developers • Main Roads WA • Mineral exploration and mining companies • Water Corporation • Western Power and other utility providers • Westrail

11 INDIGENOUS PEOPLE

The DPaW has consulted with indigenous communities in the Carnaby's cockatoo range identified in this plan. Implementation of recovery actions under this plan will include consideration of the role and interests of indigenous communities in the region. Input and involvement will be welcomed from any indigenous groups that have an active interest in areas that are habitat for Carnaby's cockatoos. A search of the Department of Indigenous Affairs' Aboriginal Heritage Sites Register has identified 168 sites in the areas that Carnaby's cockatoo populations use. However, not all significant sites are listed on the Register.

12 PREVIOUS AND EXISTING CONSERVATION MEASURES

The existing Western Australian Carnaby's Cockatoo Recovery Plan (2000 - 2009) identified five primary recovery actions; management of breeding habitat, management of feeding habitat, monitoring of populations, community involvement and captive-breeding programs. Elements of each action have been realised, however not all actions in the Recovery Plan were fully implemented.

Since the 1990 listing of the species under the *Wildlife Conservation Act 1950* as (otherwise specially protected fauna), and its threat upgrading to specially protected fauna considered likely to become extinct (threatened) in 1996, the WA DPaW has included works for the protection of the species in its annual operations. These works have included specific actions for survey and monitoring, the protection of birds and nests from illegal taking, and conservation management of breeding and feeding habitat.

12.1 Habitat Management

Habitat management is undertaken and/or coordinated by a number of organisations and institutions. DPaW manages large natural areas that provide nesting, feeding and roosting habitat for Carnaby's cockatoo as part of the reserve system. While this reserve management is intended to benefit all the biodiversity values of these areas and is not specifically targeted at Carnaby's cockatoo, the retention and management of Carnaby's cockatoo is one of the considerations of this management. BirdLife Australia's Carnaby's Black Cockatoo Recovery Project is a long running on-ground project that engages landholders to actively manage habitat for conservation (Scott and Gole 2011).

As part of a project funded through the State Natural Resource Management (NRM) program, run by the DPaW and operated on-ground by BirdLife Australia, critical nesting and foraging habitat in the wheatbelt region was identified during 2009-2010. High quality areas of remnant vegetation at those sites that would benefit from improved protection were identified and negotiations were then held with the private land owners to obtain their agreement to fence (or re-fence in some cases) those remnants. Fencing began in 2011 and once completed land owners are engaged to develop individual management guidelines for each property to help ensure the maintenance, and where necessary improvement, of the quality of the habitat. Within BirdLife Australia's programs, voluntary management agreements with private landholders are protecting and/or better managing habitat critical to survival through fencing and revegetation with appropriate plant species. Willing landowners are being directed to

relevant agencies to establish conservation covenants or voluntary management agreements over habitat critical to survival. Additionally, the Western Australian Museum has been actively identifying habitat critical to survival across the entire range of Carnaby's cockatoo.

In a project managed by BirdLife Australia, 13 Important Bird Areas (IBAs) have been designated specifically for Carnaby's cockatoo (Table 3) (Dunstan *et al*. 2009). IBAs are sites of global bird conservation importance and are considered a priority for bird conservation. The criteria used for the designation of IBAs for Carnaby's cockatoos are sites supporting at least 20 breeding pairs, or 1% of the population regularly utilising an area in the non-breeding part of the range. In addition to the IBAs listed in Table 3, a number of other IBAs were designated primarily for other species but also list Carnaby's cockatoos as breeding. These IBAs may also meet designation criteria in the future.

Table 3: Important Bird Areas (IBAs) designated specifically for Carnaby's cockatoo.

IBA Name	Summary
Bindoon-Julimar	Supports at least 110 pairs in nesting and associated feeding habitat; this is the largest population of breeding birds in south-west Australia.
Calingiri	Supports up to 20 breeding pairs which nest in woodland remnants and isolated paddock trees and feed in native shrublands.
Cataby	Supports up to 24 breeding pairs which nest in woodland remnants and isolated paddock trees and feed in native shrublands.
Coomallo	Supports up to 40 breeding pairs which nest in woodland remnants and isolated paddock trees and feed in native shrublands.
East Borden	Supports at least 20 breeding pairs which nest in woodland remnants and feed in native shrublands.
Gillingarra	Supports up to 20 breeding pairs which nest in Marri trees and feed in native shrublands.
Jalbarragup	Supports at least 20 breeding pairs and at least three breeding pairs of the endangered Baudin's cockatoo and associated habitat within a 10 km radius of the locality of Jalbarragup.
Koobabbie	Supports up to 32 breeding pairs which nest in Salmon Gum on the property.
Kwobrup-Badgebup	Supports up to 20 breeding pairs
Moora	Supports up to 60 breeding pairs
Northern Swan Coastal Plain	Supports 4,600-15,000 birds in the non-breeding season and a small number of pairs of breeding birds; this is the largest population of non-breeding birds in south-west Australia.
Stirling Range	Supports populations of Carnaby's cockatoo
Walebing	Supports up to 40 breeding pairs which nest in woodland remnants and isolated paddock trees and feed in native shrublands.

(refer to http://www.birdsaustralia.com.au/our-projects/important-bird-areas.html for more information on IBAs)

BirdLife Australia and the DPaW have collaboratively developed the methodology to map roosting cockatoos on the Swan Coastal Plain, and DPaW and WA Department of Planning have collaborated to develop maps for the Swan Coastal Plain and adjacent Jarrah Forest depicting indicative breeding, roosting and feeding habitat (based on datasets from the Great Cocky Count 2010 and 2011 surveys, and WA Museum data) (Glossop *et al*. 2011).

The *Plants for Carnaby's Search Tool* (Groom 2010a) is an on-line resource available on the DPaW webpage which provides information on plants used by Carnaby's cockatoos for food, night roosting or nesting, and captures information from both the published and unpublished literature.

Research to provide a greater understanding of available food resources and their use by Carnaby's cockatoos is underway on the Swan Coastal Plain (Johnston 2011) and will help provide land managers and decision makers with a tool to determine what natural resources must be conserved, and where in the landscape those resources need to be maintained.

Over the last 16 years damaged and degraded natural nest hollows used by Carnaby's cockatoo have been repaired as part of a long-term program coordinated by BirdLife Australia. Furthermore, the installation of PVC artificial nest hollows has been trialled as part of a WA Museum program. Artificial hollows have been erected on a variety of tenures including private property, state forest, road verges and shire reserves (Groom 2010b). Of the three black cockatoo species occurring in the south-west of Western Australia, Carnaby's cockatoo has been found to be the most willing species to use artificial hollows. The underlying philosophy for using artificial hollows, the key elements of design and construction and the need for regular maintenance and monitoring have been described in a series of three information sheets produced by DPaW and the WA Museum (DEC 2011a, 2011b and 2011c). The methodology for repairing existing, but substandard, natural hollows is described in an information brochure being developed jointly by BirdLife Australia and DPaW.

The Australian and WA Governments have been discussing cooperative approaches to the assessment of urban land development proposals. SEWPaC has required offsets as conditions of approvals for actions that impact on matters of national environmental significance. The offset packages have included funding for purchase of uncleared areas which contain like-for-like habitat, retaining vegetation on-site, planting new street trees and rehabilitation of nearby degraded sites with seed and/or topsoil from the cleared site to enhance or create new habitat,

and the establishment of artificial nest hollows. As of October 2011 the acquisition of a total of 5,500 ha of Carnaby's cockatoo habitat had been finalized and purchased as part of the offset process, and 8,500 ha are in negotiation.

At the time of preparing this Recovery Plan the WA State Government and the Australian Government were cooperating in a strategic assessment of the Perth and Peel regions of Western Australia in accordance with section 146 of the EPBC Act. This strategic Assessment is considering the conservation of Carnaby's cockatoo and other matters of National Environmental Significance under the EPBC Act.

12.2 Monitoring

Accurately monitoring a highly mobile but fragmented species which displays seasonal migratory patterns linked to breeding is difficult. A number of approaches have been attempted and many have adapted over time. This section is limited to presenting only current monitoring initiatives.

The Great Cocky Count is an annual survey initiated and coordinated by BirdLife Australia and undertaken by hundreds of volunteers. It was first organised in 2006 as a community-based survey aimed at describing the pattern of Carnaby's cockatoo abundance and providing a minimum population estimate of cockatoos on the Swan Coastal Plain (Shah 2006). An important insight from this 2006 survey was the value of counting birds at night roosts, as a means of monitoring population size, and a methodology was established based on Berry (2008). Since 2010 the Great Cocky Count has been undertaken annually by BirdLife Australia with funding from DPaW and the Australian Government (Burnham *et al*. 2010; Kabat *et al*. 2012) and in 2011-2012 it was expanded beyond the Swan Coastal Plain to include regional areas.

BirdLife Australia has established a long-term monitoring program where nesting sites on private properties have been identified and many are surveyed annually. This monitoring began in the northern agricultural region in 2001 and in the south coast and south eastern wheatbelt in 2006.

The DPaW has been monitoring key nesting sites in the northern wheatbelt since 2003 and more recently in the southern wheatbelt since 2009. During this annual monitoring program the nesting productivity of key sites is measured along with measurements of relative health status of nestling Carnaby's cockatoos. Data from this program have been combined with those of Saunders (1986, 1990; Saunders and Ingram 1998) and new analyses carried out.

This research has shown a clear, significant and negative relationship between the extent of clearing of native vegetation within 6 km of key nesting sites and the nesting success and proportion of chicks whose body weight is more than one standard deviation below an established benchmark for Carnaby's cockatoo chicks. The relationship holds at a distance of up to 12 km from the nest sites, but is not significant ($p>0.05$). It also appears that key sites at the north-eastern margin of the breeding range of Carnaby's cockatoo that appear to be productive in terms of the number of nests and nestlings produced, are below average in terms of the chicks body weight in relation to age. This suggests that in the event of any further loss of foraging habitat or continued decline in rainfall associated with climate change, the breeding range of Carnaby's cockatoo will contract westwards in that part of its breeding range. At present there is no matching evidence to suggest a similar trend in the southern part of the species' breeding range.

A monitoring method has been developed that allows marked (i.e. leg banded) Carnaby's cockatoos to be identified without the need to capture and physically restrain the birds to confirm their identity (see Saunders *et al.* 2011b). Though leg banding has been widely used in bird monitoring worldwide, this technique uses photography to identify individuals and is proving reliable and easy to apply.

A collaborative health monitoring project between Murdoch University (School of Veterinary Biology), Perth Zoo, BirdLife Australia and DPaW that commenced in November 2010 is now examining nestlings at a range of sites across the known breeding range of Carnaby's cockatoo to determine baseline blood profiles for healthy chicks in nest hollows which can be compared with sick or injured wild birds received at the Perth Zoo. The project will also determine the presence and prevalence of diseases such Beak and Feather Disease Virus, Avian polyomavirus and *Chlamydophila psittaci* (Warren *et al.* 2011). A part of this project is also designed to collect skin tissue samples from known age birds to allow an 'age curve' to be developed for black cockatoos (*Calyptorhynchus* spp.). This can then be compared with samples from wild birds that are received at the Perth Zoo and other rehabilitation facilities. Knowing the age demographics of the birds that are being killed or injured will provide important information on whether recruitment (post-fledging) is limited or whether a disproportionate amount of the adult breeding birds are being lost from the wild population. Additional samples are taken to build DNA sequences and genotype databases for other uses (see below).

12.3 Captive Management Program

A captive rearing program was undertaken between 1996 and 1999 to decrease the domestic retail price for Carnaby's cockatoos in an attempt to reduce the motivation for illegally taking eggs or chicks from the wild. Between 1996 and 1998, 148 eggs and chicks were collected from the wild, of which 124 chicks (84%) survived to January 1999 (CALM 1999). The majority of these birds were subsequently sold, through a public tender process, into private aviculture. This resulted in the average domestic price for Carnaby's cockatoo's falling from $3000 per bird to around $1100, which remains the average price since that time. In addition, the increase in the number of provenanced birds derived from the captive rearing program provided new blood-stock for captive breeding efforts within private aviculture. One aspect of aviculture involving Carnaby's cockatoos that has not been resolved is the very low rate of captive breeding. Most other species of black cockatoos (*Calyptorhynchus* spp.) breed well in captivity, but Carnaby's cockatoo is proving the exception. Until this problem is solved there will still be a demand that will encourage illegal taking from the wild stocks. Regardless of any progress on captive breeding, there will also still be an illegal trade of eggs for the international market. The continued future involvement of SEWPAC and Australian Customs to help address the illegal international trade will be important.

Injured or 'derelict' cockatoos that cannot be released back to the wild are held in captivity under a DPaW managed program. While the number of Carnaby's cockatoos that are retained in captivity as a result of injuries sustained in the wild continues to increase, the rate at which new birds are added to the captive flock is declining as rehabilitation techniques developed by the Perth Zoo and private rehabilitation groups improves (see Saunders *et al.* 2011b).

The capacity to successfully identify when illegal taking of eggs and chicks from the wild has taken place has improved dramatically in the past five years, due to the knowledge gained during a PhD project undertaken at Murdoch University (White 2011). Twenty-two micro-satellite markers have been developed for use in black cockatoo systematics (White *et al.* 2011) and the entire genome for Carnaby's cockatoo has been sequenced (White 2012). Successful prosecutions for illegal taking of black cockatoos, including Carnaby's cockatoos, have been achieved based on these DNA technologies (White *et al.* 2011b).

12.4 Community Actions

Carnaby's cockatoo has a large degree of community interest due to its significant presence in the skies and trees of south-western Australia. Community-based programs include those that

raise awareness and the profile of the species as being threatened with extinction, and those that deliver direct species conservation outcomes.

Community awareness programs include:

- Cockatoo Care program co-ordinated by the Western Australian Museum
- Information sheets at the Western Australian Museum and on their website
- BirdLife Australia Carnaby's Black-Cockatoo Recovery Project
- Public awareness programs at Perth Zoo and black cockatoos used for public presentations at schools, fetes and conferences to increase community education and awareness
- The Black Cockatoo Preservation Society Education Program
- Websites with dedicated pages dealing with the conservation of black cockatoos (e.g. WA Museum website; DPaW website; Perth Zoo website; BirdLife Australia website)
- Various, and numerous local and regional community groups promoting awareness.

Programs that deliver direct conservation outcomes include BirdLife Australia's Carnaby's Black-Cockatoo Recovery Project which support and financially assist private landholders to undertake recovery actions (fence, revegetate and repair hollows), provide weed and competitor control as appropriate, and collect distribution data and monitor nesting (e.g. Great Cocky Count) (Scott and Gole 2011).

A collaborative program between the Perth Zoo and the Murdoch University School of Veterinary Biology has further enhanced the capacity to manage wild black cockatoos taken into care. A post-graduate placement as a clinical veterinarian at Perth Zoo provides an opportunity to investigate aspects of the veterinary treatment and rehabilitation of endangered Western Australian black cockatoos and the health status of free-living black cockatoo nestlings. Information arising from these studies will be important for the future care of cockatoos received at Perth Zoo and private veterinary practices, and for the subsequent care and rehabilitation of injured birds in the purpose-built cockatoo rehabilitation facilities.

There are a number of community run wildlife rehabilitation facilities that now have the appropriate facilities and techniques to cater for sick, injured or orphaned black cockatoos. These include Kaarakin Black Cockatoo Rehabilitation Centre and Native Animal Rescue.

In December 2008, 75 scientists, conservation workers and community members attended a symposium and workshop in Perth on Carnaby's cockatoo, jointly organised by BirdLife

Australia, DPaW and WWF-Australia, to help promote collaboration and information sharing (Burbidge 2009). The workshop aimed to identify key conservation issues for the future, and developed a strategic framework to help guide management and conservation of Carnaby's cockatoo and these have informed the development of this Recovery Plan. In 2010 the Urban Bushland Council WA organised a symposium titled Endangered Black Cockatoos in Western Australia with 12 presenters covering the biology, natural history, threats and conservation efforts, and published the proceedings (Kendrick 2011).

13 RECOVERY STRATEGY

Full recovery of a long-lived species such as Carnaby's cockatoo will take many decades, requiring reversal of the threats and factors that have lead to the decline in the species before significant increases in numbers of breeding birds and finally in the overall species population can occur. This recovery plan covers a ten year period and identifies the recovery objective, success criteria and the actions required over those ten years to progress towards the longer term recovery of the species. This phase will focus primarily on reducing the rate of decline in the species population, and in increasing the proportion of the population that is successfully breeding.

13.1 Recovery Objective

To stop further decline in the distribution and abundance of Carnaby's cockatoo by protecting the birds throughout their life stages and enhancing habitat critical for survival throughout their breeding and non-breeding range, ensuring that the reproductive capacity of the species remains stable or increases.

13.2 Performance Criteria

This Recovery Plan will be deemed completely successful if, within a ten year period, all of the following are achieved:

- The species' area of occupancy does not decline. In the absence of any improved methods this will be measured by the same method used, and compared with the values calculated, in this Recovery Plan: 60,525 km^2 using a grid size of 15 x 15 km. (The measure of the area of occupancy may be upgraded during the life of the plan provided the benchmark established here is not substantially changed under the replacement system.)
- The number of breeding pairs of Carnaby's cockatoos at pre-determined (and recorded in advance) breeding sites across the breeding range remains stable or increases, averaged over three consecutive years. (Any changes in the breeding sites counted for this measure are to be approved by the DPaW Director, Nature Conservation and to remain statistically comparable with sites used at the commencement of this plan.)
- Estimates of the number of birds and proportion of juveniles across the entirety of known (standardised) night roost sites across the range of the species remains stable or increases, averaged over three consecutive years.
- The extent of nesting habitat (trees with nesting hollows), feeding habitat (as defined by vegetation complexes or suitable revegetation), and night roosting habitat (as identified through community survey) are maintained throughout the species range.

This Recovery Plan will be deemed to not be successful if, within a ten year period, any of the following are occur:

- The area of occupancy declines by more than 10% below 60,525 km^2 using a grid size of 15 x 15 km^2 (or similar change in amended methodology).
- The number of breeding pairs of Carnaby's cockatoos at monitored breeding sites across the breeding range decreases by more than 10% averaged over three consecutive years.
- The estimated number of adult and proportion of juvenile Carnaby's cockatoos at known night roost sites decreases by more than 10% averaged over three consecutive years.
- The extent of nesting habitat (trees with nesting hollows), feeding habitat (as defined by vegetation complexes), and night roosting habitat (as identified through community survey) decreases by more than10% throughout the species range.

14 RECOVERY ACTIONS

The recovery actions below are presented in themes. They are set out in general order of priority however this should not prevent the implementation of lower priority actions where opportunities arise.

Recovery actions are summarised in Table 4 with timing and indicative costs.

Action 1: Protect and Manage Important Habitat

Complete restoration of the original extent of Carnaby's cockatoo habitat is not possible. It is therefore important to identify those parts of the species' habitat most critical to survival and to protect and manage as much of this important habitat as possible to minimise the impacts of habitat loss. While planting of species that support Carnaby's cockatoo is effective over the long-term and encouraged, protection and regeneration of existing habitat is significantly more efficient and effective. Therefore efforts in this Recovery Plan are primarily directed towards protection and enhancement of existing habitat.

The reproductive output of Carnaby's cockatoo is primarily limited by factors associated with habitat and food requirements during the breeding season. However, sufficient habitat and food resources during the non-breeding season are also critical for both survival of young and in conditioning breeding birds. Therefore Recovery Actions have been directed towards the protection of both breeding and non-breeding habitat.

Management of breeding habitat and associated feeding habitat

Tasks include:

- Locate and map breeding sites, including currently recognised Important Bird Areas (see Table 3), across the breeding range and identify those that are most important for the conservation of the species based on factors such as site size, site productivity and the number of breeding pairs that use the site.
- Ensure protection of areas of existing and potential breeding habitat, including consideration during statutory planning and environmental approvals processes.
- Implement management to protect and improve the condition of breeding habitat and associated feeding habitat, including activities that:
    - Prevent clearing and loss of breeding and associated feeding habitat;
    - Control grazing (e.g. fencing to exclude stock and control rabbits);
    - Manage fire regimes, salinity, weeds and dieback;

    - Promote regeneration and revegetate areas within and adjacent to breeding habitat and associated feeding habitat;
    - Prevent further degradation of habitat;
    - Maintain natural and artificial water sources used by cockatoos.
- Replace any loss of feeding habitat, and increase the area of feeding habitat near known breeding sites (within 12 km) by regeneration and revegetation with cockatoo feed species.
- Increase hollow availability by reducing the impact of nest competitors (e.g. feral European honeybees, galahs and corellas) and repairing damaged and suboptimal hollows.
- Supplement hollow availability at breeding sites by installing and maintaining artificial nest hollows.
- Improve the protection of breeding habitat and associated feeding habitat through purchase and transfer of vesting, conservation covenants, or other appropriate means.

Protection and management of non-breeding habitat

Tasks include:

- Locate and map feeding habitat sites (with associated night roosts and watering sites) throughout the non-breeding range and identify the most important areas that if lost would have the greatest impacts on the species. Prioritise the following protection and management actions on these sites to maximise the conservation benefits of management.
- Improve the security of tenure and management of important areas of feeding habitat through purchase and transfer of vesting, conservation covenants, or other appropriate means.
- Ensure protection of important areas of feeding and night roost habitat, including consideration during statutory planning and environmental approvals processes.
- Implement management to protect and improve the condition of feeding habitat and night roosts throughout the non-breeding range, including activities that:
    - Prevent clearing and permanent habitat loss;
    - Control grazing (e.g. fencing to exclude stock and control rabbits);
    - Manage fire regimes, salinity, weeds and dieback;
    - Promote regeneration and revegetate within and adjacent to night roosts and associated feeding habitat;
    - Maintain natural and artificial water sources used by cockatoos.

- Maintain or increase the area of non-breeding feeding habitat and night roosts by planting areas of native vegetation (to increase area, provide a buffer or a linkage, particularly within 6 km of existing roost sites) and investigate the value of providing artificial water sources at potential roost locations.
- Develop and implement approaches to avoid, mitigate or offset impacts of harvesting pine trees without replacement, especially in the Yanchep, Pinjar and Gnangara plantations.

Action 2: Undertake Regular Monitoring

Regular monitoring of Carnaby's cockatoo populations and habitat will provide information on the size of the breeding population, breeding success, and use of habitat by the species, and changes in those parameters over time. The following activities will be used to establish a monitoring framework and monitoring protocol to inform the measurement of success of recovery actions. This monitoring framework will be informed by new knowledge and may change with improved understanding.

Monitoring breeding

Tasks include:

- Develop and implement standard protocols for monitoring breeding success and the quality of nestlings in comparison to historic benchmarks across the current breeding range.
- Monitor use and success of artificial nest hollows across the distribution of Carnaby's cockatoo.
- Monitor vegetation condition of breeding habitat and feeding habitat, including nesting hollows, and stand structure of woodlands across their range.
- Monitor effectiveness of nest competitor (e.g. galah, corella and feral honey bee) control actions at breeding sites (i.e. removal of competitors and subsequent use by Carnaby's cockatoo).

Monitoring non-breeding factors

Tasks include:

- Monitor night roost sites (such as through the Great Cocky Count) to determine the number and distribution of roosts, number of birds in night roosts, and use of night roosts within and between years.

- Monitor extent and condition of feeding habitat across the non-breeding range, including monitoring the impact of threatening processes on habitat.
  Monitor the use of newly established and revegetated non-breeding habitat by Carnaby's cockatoo.

Action 3: Conduct Research to Inform Management

Further research and knowledge into the biology and ecology of Carnaby's cockatoo is required in order to inform the best management. Research and surveys are important to enable accurate monitoring of the population, its conservation status and the effectiveness of recovery actions.

Tasks include:

- Establish and maintain a register of research priorities for Carnaby's cockatoo.
- Identify, centralise and consolidate existing (and future) data including addressing issues relating to access and custodianship.
- Establish a robust population model using all available information for use in decision making.
- Conduct studies into the age structure demographics of Carnaby's cockatoos in breeding and non-breeding habitat.
- Study the impact of pine plantation removal on Carnaby's cockatoos and their feeding / night roosting requirements.
- Assess the size and health of breeding populations across the breeding range.
- Confirm habitat preferences of Carnaby's cockatoo across its range, including the importance of the southern Swan Coastal Plain and south coast.
- Research Carnaby's cockatoo movements, feeding and roosting behaviour to better understand how they use resources.
- Conduct climate change modelling to better inform future management actions around priority sites.
- Describe any genetic structuring in the population.
- Conduct longitudinal studies of the epidemiology and clinical significance of BFDV and APV infections in wild populations

Action 4: Manage Other Impacts

The impacts of other factors detrimentally affecting Carnaby's cockatoos such as motor vehicle collisions and illegal activities needs to be monitored and programs developed to manage these for species conservation, and to rehabilitate injured birds.

Tasks include:

- Monitor patterns, trends and impacts of factors such as motor vehicle collisions and illegal activities (e.g. habitat destruction, poaching and shooting).
- Develop and implement strategies to reduce the incidence of motor vehicle collisions (e.g. identification of hotspots, signage, road design, planting of food resources and drainage).
- Implement and publicise enforcement programs to counter illegal taking of Carnaby's cockatoo (poaching and shooting).
- Support black cockatoo rehabilitation programs which ensure that injured and debilitated wild black cockatoos receive specialised veterinary treatment and assessment, and monitor the success rate of rehabilitating injured birds back to the wild.

Action 5: Engage with the Broader Community

Since Carnaby's cockatoo occurs over a range of land tenures, including private property, coordinated public information and participation programs are an essential strategy for its recovery. Facilitation of public awareness and community involvement in conservation projects, and good communication between the Recovery Team, community groups and individual landholders is vital.

Carnaby's cockatoos are a highly visible and charismatic species and have engendered strong community interest. This interest has been fostered through community and education programs developed and disseminated by both government and non-government organization. These networks are well placed to expand upon existing programs and further increase the stewardship of Carnaby's cockatoo by the community.

Tasks include:

- Promote awareness of the conservation needs of Carnaby's cockatoo and support for its recovery within the broader community (public, industry, business and government).
- Develop information and guidelines for management of Carnaby's cockatoo habitat in formats that can be used by individuals, groups and organisations/agencies.

- Encourage and support landholder and community volunteer participation in conservation actions for Carnaby's cockatoo by way of extension, stewardship and incentive programs which result in the retention and management of Carnaby's cockatoo habitat on private land.
- Provide opportunities for community participation in activities that improve or protect habitat and decrease threats to the species such as coordinated programs for monitoring and management of areas.
- Seek resources through budget allocations, grants, donations and sponsorships to fund programs to assist landholders, agencies and community groups to recover Carnaby's cockatoo and its habitat (e.g. restoration and revegetation).

Action 6: Undertake Information and Communication Activities

One of the best means of improving the conservation status of Carnaby's cockatoos will be to achieve a higher level of acceptance and understanding by decision makers of the importance of, and the roles they can play in, the conservation of this species. One means to help achieve this is through programs raising the awareness of decision makers of the species conservation needs and urgency. A second means is through expanding the establishment of joint management agreements for habitat protection. The sharing of information between agencies and groups and individuals involved actively in land conservation will also assist in achieving this.

Tasks include:

- Develop and distribute awareness raising and guidance materials for decision makers and proponents aimed at:
  - increasing awareness of the habitat and conservation requirements of Carnaby's cockatoo and importance of local areas;
  - improving land use planning so as to minimise the potential for conflict with Carnaby's cockatoo (e.g. locating orchards, commercial plantations and roadside plantings).
- Establish joint management agreements or memoranda of understanding with agencies that manage lands (e.g. Water Corporation, local government authorities, etc.) that are utilised by Carnaby's cockatoos.

- Provide for improved sharing of information between State and Commonwealth agencies concerning environmental impact assessment and enforcement activities under State and Commonwealth legislation.

15 IMPLEMENTATION AND EVALUATION

Recovery Teams provide advice and assist in coordinating actions prescribed in recovery plans. Recovery teams include representatives from organisations with direct interest in the recovery of the species, including those involved in funding, carrying out or helping to carry out actions that support the recovery of the species. The Carnaby's Cockatoo Recovery Team was first established in 1999 to coordinate the recovery of the species and the development and implementation of the initial recovery plan (Cale 2003). Originally the team comprised of representatives from DPaW, CSIRO, WA Museum, Perth Zoo, BirdLife Australia and a private landowner. Over time other organisations and individual have been invited to join the team or to share their expertise, experience and knowledge with the recovery team.

The DPaW, in consultation with the Carnaby's Cockatoo Recovery Team, will evaluate the performance of this Recovery Plan, and in particular the performance against the recovery objective and the criteria for success and failure, so as to review and change the recovery actions in response to new information. One of the Recovery Actions is to set up a monitoring framework and protocols, and this will inform the measurement of success and failure criteria. The plan will otherwise be reviewed within five years of its adoption, again ten years after adoption if not replaced prior to that time. The recovery actions carried out, and any changes to management and recovery actions, will be documented accordingly and the plan amended if necessary.

The estimated cost of implementing this Recovery Plan is $7,730,000 over ten years (Table 4). However, this estimated figure does not include costs associated with the ongoing management of habitat by DPaW, other government agencies and private land owners, or all the costs associated with the creation of new habitat, and the re-creation habitat lost to clearing. Nor does it include costs associated with mitigating any loss of habitat due to development proposals that may be approved and undertaken at any point in the next 10 years. It should also be noted that volunteers undertake a great deal of work associated with the recovery of this species which is not reflected in the estimated implementation costs.

15.1 Estimated Costs of Recovery Actions

Table 4: Summary of recovery actions over ten years and indicative costs.

Recovery Action Theme	Year 1 Cost ($1,000s)	Year 2 Cost ($1,000s)	Year 3 Cost ($1,000s)	Year 4 Cost ($1,000s)	Year 5 Cost ($1,000s)	Year 6 Cost ($1,000s)	Year 7 Cost ($1,000s)	Year 8 Cost ($1,000s)	Year 9 Cost ($1,000s)	Year 10 Cost ($1,000s)	**Total Cost ($1,000s)**
1: Protect and Manage Important Habitat Identify, protect and manage habitat critical to survival (nesting, foraging and roosting) for Carnaby's cockatoo across their breeding and non-breeding range	345,000	345,000	315,000	315,000	215,000	165,000	165,000	165,000	165,000	165,000	**2,360,000**
2: Undertake Regular Monitoring Monitor population parameters, habitat, threats and status of Carnaby's cockatoo	220,000	220,000	130,000	130,000	150,000	130,000	120,000	120,000	140,000	160,000	**1,520,000**
3: Conduct Research to Inform Management Undertake research into the biology, ecology and conservation management of Carnaby's cockatoo	300,000	270,000	300,000	240,000	145,000	40,000	40,000	40,000	45,000	40,000	**1,460,000**
4: Manage Other Impacts Monitor the impacts and implement strategies to reduce anthropogenic factors affecting Carnaby's cockatoos, and support rehabilitation programs	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	110,000	**1,100,000**
5: Engage with the Broader Community Engage with and involve people across the community in the conservation of Carnaby's cockatoo	105,000	105,000	85,000	65,000	65,000	65,000	65,000	85,000	85,000	65,000	**790,000**
6: Undertake Information and Communication Activities Develop and distribute educational and guidance materials for decision makers, establish joint management agreements and provide for information sharing	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	**500,000**
TOTAL	**1,130,000**	**1,100,000**	**990,000**	**910,000**	**735,000**	**560,000**	**550,000**	**570,000**	**595,000**	**590,000**	**7,730,000**

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